How did that happen? An investigation of organisational outcomes when technology is used for knowledge sharing

---

A thesis submitted in partial fulfilment of the requirements for the

Degree of Master of Commerce in Accounting and Information Systems Management

at the University of Canterbury, Christchurch, New Zealand

Alison McIntyre

University of Canterbury

Te Whare Wānanga o Waitaha

2018

Contents

List of Tables and Figures

Acknowledgements

To Nelly Todorova, my supervisor, thank you for your encouragement to take this on in the first place, for your patience and good humour in getting me through, and for your passion for our subject. Thank you too to Annette Mills, my co-supervisor for your steady presence.

To my husband Robert without whom this would not have been possible, thank you for being a true partner, for your constant support and for believing in me. Thanks too to Eloise and Grace for your understanding when my head was in my books, for listening to the ideas, and for your thoughtfulness that helped me to persevere to complete this project.

To the participants in the study, thank you for your time and for making this possible. I learned a lot from what you know. I hope there is something useful that you can take from the findings.

To my friends and colleagues at the University of Canterbury Library and at the National Library of New Zealand and to librarians everywhere, thank you for your support to complete this thesis and for demonstrating every day what can happen when knowledge is shared.

Abstract

This research set out to investigate a specific instance of knowledge sharing in an organisation to contribute to theoretical and practical understanding of use of a knowledge sharing technology (Microsoft SharePoint). The methodology for this study was developed within the context of Critical Realism adopting the concept of affordances as generative mechanisms. The findings demonstrate that using Affordance Actualisation as a lens to develop context-specific theory can provide actionable insights for practitioners. This approach gets inside the black box of knowledge sharing in an organisation to explain how the knowledge sharing technology was implicated in the process.

1. Introduction

Knowledge is described variously as "the life-blood of organisations" (Mabey & Zhao, 2017, p. 39), "the most strategic resource in organisations" (Ipe, 2003, p. 337) and the "critical factor in how modern economies compete and how they generate wealth and wellbeing" (Leadbeater, C. (1999) p. 36 as cited in Rikowski, 2003). There is no doubt that knowledge is valued within organisations and by society at large. Governments invest in research, schools, universities and libraries to generate and disseminate knowledge for the wellbeing of their citizens. Organisations similarly invest in harnessing the knowledge assets that exist in their people and in their processes to innovate and compete in the modern knowledge economy.

Information technology has been applied in various ways to enhance the management and sharing of knowledge for a wide range of purposes. Online knowledge sharing within organisations has been found to increase the productivity of employee's as well as to improve creativity and quality of communication (Charband and Navimipour). On the other hand it has been found to be difficult to motivate employees to share knowledge and in some cases this has been found to be further exacerbated by lack of confidence in virtual environments (Charband and Navimipour). Clearly information technology alone will not result in the organisational knowledge sharing outcomes that organisations desire.

Knowledge sharing is not a new topic for research however the use of technology in knowledge sharing raises some new and interesting questions. Much of the research on knowledge sharing particularly in organisational settings has focused on what gets shared by whom rather than how (Argote & Guo, 2016; S. Wang & Noe, 2010). There has been a call for more research that gets inside the "black box" of organisational processes involving information technology to better understand how processes unfold and how the technology is implicated (Boudreau & Robey, 2005; Faraj & Azad, 2012; Henfridsson & Bygstad, 2013; Hutchby, 2001; Leonardi, 2011; Leonardi & Barley, 2008; Markus & Silver, 2008). Bringing the technology into focus has supported recent studies of the effectiveness of technology enabled organisational processes which promise benefits for practitioners as well as researchers (Burton-Jones & Volkoff, 2017; Eden et al., 2018).

Affordance theory offers a technology-in-use approach suitable for the study of complex socio-technical phenomena such as the use of technology for knowledge sharing. Affordance in Information Systems research is a relational construct that links the capabilities inherent in specific information technologies to the goals of an organisation in a specific socio-technical context (Faraj & Azad, 2012; Volkoff & Strong, 2016). The investigation of such relational constructs promises new insights into experiences of IT-Associated innovation and organisational processes. Pin pointing the

role of the IT artifact in organisational processes has challenged information systems researchers (Orlikowski, 2007). Affordance theory offers a means by which the physical and material aspects of information systems can be studied as complex collective constructs within the equally complex and multi-layered socio-technical "ecosystem" of an organisation. Affordance theory has been applied to intra-organisational knowledge sharing to theorise affordances of technologies such as electronic social media network sites (Ellison, Gibbs, & Weber, 2015; Leonardi, 2017).

While technology affordances are potentials and may apply across a range of actors with the required capabilities and relevant goals, affordance actualisation relates to specific actions taken by an actor in a specific socio-temporal context (Volkoff & Strong, 2016). Strong et al. (2014) have theorised the actualisation of affordances of an electronic health records system in a healthcare organisation. In doing so they provide a lens for understanding how individual actors using information technologies contribute to organisational goals. This so called mid-range theory provides a template for further contributions to the theorising of organisation affordance actualisation (Bernhard, Recker, & Burton-Jones, 2013).

This research has two main objectives. To contribute to the development of affordance actualisation theory by applying The Theory of Organisation-EHR Affordance Actualisation (Strong et al., 2014) to another technology in a new organisational setting. The second related objective is to investigate group-level actualisation of knowledge sharing affordances for a public organisation using a knowledge sharing technology.

1.1 Research Questions

How are organisational affordances of a knowledge sharing system actualised?

What are the generative mechanisms that enable or constrain affordance actualisation?

What are the contextual conditions that relate to the consistency, extent and alignment of affordance actualisation?

How do consistency, extent and alignment of individual actualisation influence organisational outcomes?

2. Literature Review

The phenomenon of interest in this study is organisational knowledge sharing using information technology. This is a broad research topic with several contributing research streams. First the concepts of knowledge and knowledge sharing are defined. An overview of organisational knowledge sharing literature is presented before focusing on the narrower stream of research that relates to knowledge sharing using knowledge sharing technology from an information systems perspective. The theoretical framework is a feature of this study in particular affordance actualisation theory and critical realism. The development of the affordance theory in information systems research is reviewed with particular emphasis on affordance actualisation and organisational-level affordance. A research gap is identified in mid-range theorising using affordance actualisation theory relating to group-level affordance actualisation. Finally mid-range theory and critical realism are discussed to weave together strands from the research on organisational knowledge sharing and affordance actualisation within a coherent ontological and methodological framework for the current research.

2.1 Knowledge, knowledge sharing and the role of IT

To begin to understand the role of information technologies in organisational knowledge sharing it is useful to have some working definitions for what is meant by knowledge and therefore knowledge sharing in the context of organisations. Herein lies the first complexity in this research endeavour. There is no single definitive view of organisational knowledge in the information systems and knowledge management literature (2004 as cited in Gustavsson, 2001, p. 911; Ibrahim, 2017; Klein, 2008; Mingers, 2008; Mingers, 1995; Todorava, Remus, & Cragg, 2012). The concepts of tacit knowledge and explicit knowledge (Alavi & Leidner, 1999; Nonaka, 1994; Polanyi, 2009) are well established but there is debate about their dimensions and the relationship between them (Ipe, 2003; Klein, 2008). Two main epistemological perspectives have emerged, an objectivist perspective and a practice-based perspective (Ibrahim, 2017). Cook and Brown (1999) label these two perspectives 'the epistemology of possession' in which knowledge is objectified and is attributed the properties of things (Gustavsson, 2001) and 'the epistemology of practice' in which knowledge is understood to be socially constructed and is attributed the properties of action or process and is relational (Ibrahim, 2015).

Accepting this view that knowledge is multifaceted and at times ambiguous it is necessary to consider what it means to share knowledge in an organisation using knowledge sharing technology. Organisational knowledge sharing is defined by Ipe (2003, p. 338) as "the movement of knowledge within organisations". Knowledge transfer and knowledge diffusion are terms used interchangeably with knowledge sharing in the literature (Alavi & Leidner, 2001; Ipe, 2003; Klein, 2008). What exactly is it then that is being moved, transferred or diffused and what is the role of knowledge sharing technology in effecting knowledge sharing outcomes? After all computers process information they do not process knowledge (Mingers, 1995). Nonaka, Toyama, and Konno (2000, p. 7) give this definition for the relationship between information and knowledge "Information becomes knowledge when it is interpreted by individuals and given a context and anchored in the beliefs and commitments of individuals". In their seminal paper on knowledge management and knowledge management systems Alavi and Leidner (2001, p. 119) describe the role of information technology as supporting and increasing knowledge transfer by enabling

communication and the flow of information. The relationships are more precisely drawn by Mingers (1995, p. 303) who explains that information systems are part of human meaning systems in which the process of "intersubjective communication" is the mechanism by which meaning is generated from information and becomes accessible to human actors as knowledge.

This explanation specifies relationships between information and information technology as structures within a human meaning system such as an organisation, but leaves unspecified the relationships between individual actors and groups of actors as possessors of knowledge and in the process of generating knowledge (Mingers, 1995). Nonaka et al. (2000) describe interpretation by individuals within this process but the concepts of sharing, organisations and even knowledge itself are intersubjective and therefore necessarily involve more than one individual. Cook and Brown (1999, p. 386) differentiate group knowledge from individual knowledge with respect to knowledge that is possessed and knowledge as practice. "The body of knowledge" they say "is possessed by groups, not by individuals" and "is held in common by the group." (Cook & Brown, 1999, p. 386). Furthermore they propose that "the work done by a group, as informed by the body of knowledge it possesses, is work that is epistemically distinct from work done by an individual in it, as informed by the knowledge he or she possesses." (Cook & Brown, 1999, p. 386). These differences have implications for understanding the ways in which knowledge might be shared or transferred within the context of an organisation.

2.2 Organisational knowledge sharing

Knowledge sharing in organisations has been researched over many years from many different perspectives including organisational behaviour, human resources, operations management and information systems. Reviews by Argote and Guo (2016), S. Wang and Noe (2010) and Vaghefi, Lapointe, and Shahbaznezhad (2018) summarise research findings relating to sharing knowledge between and among individuals and groups in organisations. Predictors and consequences of knowledge sharing were found to be the most frequent topics of research with particular emphasis on organisational context, interpersonal and team characteristics, cultural characteristics, individual characteristics and motivational factors (Argote & Guo, 2016; S. Wang & Noe, 2010). Knowledge was found to be difficult to transfer across organisational contexts, and dependent on motivation, ability and opportunity within the organisation (Argote & Guo, 2016). Furthermore knowledge sharing technologies were found to have contrasting effects in different organisations (Argote & Guo, 2016, p. 151). A recent study (Dulipovici & Vieru, 2015) adopted a sociomaterial practice perspective to understand why a knowledge sharing technology was used differently across groups within the same organisational context. Greater attention to forms of organising and to levels of analysis such as individual, group level or organisation level, is called for in order to better understand multilevel knowledge sharing processes across time (Argote & Guo, 2016; Vaghefi et al., 2018).

Research on the relationship between technology and the form and function of organisations is well represented in the information systems literature (Leonardi, 2011, 2013b; Orlikowski, 2007; Robey, Anderson, & Raymond, 2013; Twum-Darko & Harker, 2017; Winter, Berente, Howison, & Butler, 2014). As well as the social units within organisations and levels of organising the roles of actors within these units, their routines, tools and networks are identified as factors in organisational knowledge sharing (Argote & Guo, 2016; Robey et al., 2013). Organising arrangements are found to be flexible and so too are information technologies (Argote & Guo, 2016; Leonardi, 2011, 2013a;

Winter et al., 2014). Organisations provide critical resources for work including enterprise information technologies. They employ individuals and take on legal status as entities but they can no longer be understood to contain work (Winter et al., 2014) rather organising arrangements and information technologies are understood to be dynamic and intertwined. In the words of Orlikowski (2007, p. 1437) they are "constitutively entangled". The complexities of both information technologies and organisational arrangements must be considered simultaneously in seeking to investigate processes such as organisational knowledge sharing and in defining the social and technical boundaries within which they operate (Strong & Volkoff, 2010; Winter et al., 2014; Zammuto, Griffith, Majchrzak, Dougherty, & Faraj, 2007).

Recently attention to online knowledge sharing and notably to social media for organisational knowledge sharing further illustrates this constitutive entanglement (Charband & Jafari Navimipour, 2016; Kane & Alavi, 2007; Leonardi, 2017; Majchrzak, Faraj, Kane, & Azad, 2013). Charband and Jafari Navimipour (2016) identified 55 studies in high ranking journals published between 2000 and 2015 on aspects of online knowledge sharing. Online knowledge sharing was found to make the sharing process faster, easier and more convenient (Charband & Jafari Navimipour, 2016). Furthermore the introduction of social media technologies during this period has been found to have a "revolutionary effect" on organisational knowledge sharing (Kane & Alavi, 2007; Leonardi, 2017; Majchrzak et al., 2013).

Social media is described as "a diverse and evolving technological infrastructure that supports and changes the way people communicate and collaborate" (Kane & Alavi, 2007, p. 37). This notion of dynamic technological assemblages challenges traditional conceptions of organisation and organising. It shifts knowledge sharing from centralised to decentralised communities, from intermittent contributions to ongoing conversations and from a storage based paradigm to that of "emergent unplanned knowledge contributions" (Majchrzak et al., 2013, p. 40). Leonardi (2017) attributes these effects to the "leakiness" of social media channels due to the visibility of communications and persistence over time of the captured context from which they emerged (Leonardi, 2017, p. 47). This characteristic allows new possibilities for democratising knowledge and providing new insights into behaviours within online networked communities. It also fundamentally changes the parameters for what it means to possess knowledge raising issues regarding security and privacy of information and the protection of proprietary knowledge by organisations (Charband & Jafari Navimipour, 2016; Kane & Alavi, 2007).

In a 2008 position paper on directions for research in knowledge sharing Klein (2008, p. 45) called for greater definition and stronger empirical foundation for understanding how knowledge works in organisations citing the methodological challenges in understanding the realities of inexpressible knowledge that cannot be directly observed. "How can research on the mechanics of tacit knowledge rise above mere speculation?" he asked (Klein, 2008, p. 45) . The study of organisational knowledge sharing as has been outlined here is characterised by the complexity of the phenomenon involved. The concepts of knowledge, information technology and organisation are multifaceted, intertwined and dynamic. Add to that the social, temporal and technical processes involved in knowing, in sharing knowledge and in organising and the complexity is compounded such as to be overwhelmingly complicated. The object of interest, organisational knowledge sharing, in reality is relational, emergent and shifting (Orlikowski, 2007, p. 1438). Since 2008 affordance theory has gained acceptance as a methodological approach that cuts through the complexity of socio-technical

systems in organisations enabling the rigorous and systematic investigation of topics such as organisational knowledge sharing (Bloomfield, Latham, & Vurdubakis, 2010; Faraj & Azad, 2012; Leonardi & Barley, 2008; Markus & Silver, 2008; Robey et al., 2013; Strong & Volkoff, 2010; Volkoff & Strong, 2016).

2.3 Affordance theory in information systems research

Adapted from ecological psychology, affordance theory has been applied to information systems research to move beyond the study of the IT artifact as a "black box" external to the user, and to develop a technology-in-use perspective (Bygstad, Munkvold, & Volkoff, 2016; Faraj & Azad, 2012; Leonardi, 2011, 2013a; Markus & Silver, 2008; Volkoff & Strong, 2013; Zammuto et al., 2007). Specification of the information technology and the "domain of action" are necessary to explain the relationship between technologies, users and organisations using an affordance lens (Majchrzak et al., 2013). The original insight of James Gibson (Gibson, 1979), when he proposed affordance theory was that "…wholistic relationships in stimulation, both temporal (successive) and spatial (adjacent) were as real and psychologically significant as point stimuli." (Lombardo, 1987, p. 361). That is possibilities for action are detected by interacting with an environment and through a process of learning and maturation in that environment and not just through the information received from it.

In terms of information systems research and organisational knowledge sharing this can be understood to mean that individuals have an active role in exploring, testing and tuning into the knowledge sharing technology in order to know the potential actions they might engage in as they use it in their work. In turn their developing knowledge of the potential usefulness of the knowledge sharing technology will change the ways in which they interact with it and with each other (Leonardi, 2011; Leonardi & Barley, 2008; Robey et al., 2013; Strong et al., 2014; Strong & Volkoff, 2010; Volkoff & Strong, 2013). A recent review of the application of affordance theory in information systems found 111 articles on the topic of affordances (H. Wang, Wang, & Tang, 2018). Affordance theory has been applied to the investigation of electronic health record systems in health care (Eden et al., 2018; Hausvik & Thapa, 2017; Strong et al., 2014), information systems in environmental sustainability transformations (Seidel, Recker, & vom Brocke, 2013), simulation technology in engineering work (Leonardi, 2011) and social media in online knowledge sharing (Ellison et al., 2015; Majchrzak et al., 2013). H. Wang et al. (2018, p. 68) identified two theoretical gaps in affordance theory research. They recommend paying more attention to the process of affordance actualisation and to actualisation processes at an organisational level.

In an earlier review and synthesis of the information systems literature on affordance theory, Pozzi, Pigni, and Vitari (2014) identified 25 articles relating to four main areas of interest – affordance existence, affordance perception, affordance actualisation and affordance effect. Studies by Leonardi (2013b) and Bernhard et al. (2013) addressed all four areas of interest. Two studies, Volkoff and Strong (2013) and Strong et al. (2014) reported case studies which specifically addressed affordance actualisation. Volkoff and Strong (2013) extended the original affordance concept, which theorised the possibilities inherent in an environment for an actor, to make it applicable to the study of groups of organisational actors engaging with complex objects such as Information Systems. They define affordance as "The potential for behaviours associated with achieving an immediate concrete outcome and arising from the relation between an object (e.g., an IT artifact) and a goal-oriented actor or actors." (Volkoff & Strong, 2013, p. 823). Important in this definition are that an affordance

is a potential for action and not the action itself, nor is it the state or condition reached after an action is taken, and that the affordance arises from the goal directed relation between the actor and object and not from the IT artifact in isolation (Volkoff & Strong, 2016).

2.4 Actualisation of organisational affordances

Affordance actualisation is the process by which the action possibilities of affordances are realised (Bloomfield et al., 2010; Boudreau & Robey, 2005; Bygstad et al., 2016; Strong et al., 2014; Volkoff & Strong, 2013). This process involves the actual behaviours of actors in the organisation that result in observable outcomes and are specific to a particular actor and the specific actions taken (Volkoff & Strong, 2016). Volkoff and Strong (2013) develop the affordance actualisation concept by applying a critical realist perspective to two previously published case studies (Elmes, Strong, & Volkoff, 2005; Leonardi, 2013b). They identify three distinct phases in affordance actualisation which they present as a generative mechanism in line with the principles of critical realist ontology. The phases are – how affordances arise, how affordances are actualised over time and how these actualised affordances lead to observable effects (Volkoff & Strong, 2013). Anderson and Robey (2017) contribute the concept of affordance potency as a factor in individual affordance actualisation. They define affordance potency as " the strength of the relationship between the abilities of the individual and the features of the system at the time of actualisation, conditioned by the characteristics of work" (Anderson & Robey, 2017, p. 103). The strength of affordance potency is gauged by the ease with which actualisation can be carried out. Affordance potency is adopted by Hausvik and Thapa (2017) as a factor in actualisation.

The actual role of perception in affordance actualisation in information systems remains unresolved. A broader concept affordance appropriation includes affordance perception and affordance actualisation (Bernhard et al., 2013; Glowalla, Rosenkranz, & Sunyaev, 2014; Leonardi, 2013b). Lehrig, Krancher, and Dibbern (2017) separate perception from actualisation and include the concept configuration as an enabler of perception of action potentials offered by a collaboration platform. Bernhard et al. (2013) extend the model proposed by Volkoff and Strong (2013) to include perception as a separate construct. Glowalla et al. (2014) adopt this extended model and build on the work of Strong et al. (2014) by developing the appropriation construct to include constraints as the complement of affordances as well as adding misperception as the complement to perception of affordances and constraints. Volkoff and Strong (2016) on the other hand hold that perception is embedded in the affordance actualisation process and is not a separate construct. The Bernhard et al. (2013), Glowalla et al. (2014) and Lehrig et al. (2017) studies all take complex IT artifacts (Process Models, Business Intelligence as a system and a Collaboration platform) as the IT artifact of interest. They may confound the definition of affordance actualisation as the systems themselves support "cognitive use tasks" and so their detection in ecological terms requires significant cognitive processing on the part of the user.

The concept of dependencies among affordances is developed by Glowalla et al. (2014) adding constraints and emphasising the iterative nature of affordance appropriation whereby several cycles of trial and error may be necessary before an affordance is actualised. They adopt the affordance-related axial coding categories and affordance dependency mapping developed by Strong et al. (2014) to advance theorising of affordance actualisation. Subsequent papers by Giermindl, Strich, and Fiedler (2017) and Hausvik and Thapa (2017) elaborate the concept of dependencies among

affordances. Giermindl et al. (2017) contribute to understanding non-use and dependencies between non-use and affordances. They found empirical support for three propositions to explain why non-users do not actualise affordances. These were because they were not aware of the affordance existence, their subjective action goals and negative effects created by the affordance (Giermindl et al., 2017, p. 13). Hausvik and Thapa (2017) contribute path-dependencies of affordances and personal, social and environmental conversion factors. They found that affordances emerged in two levels, one level which is dependent on the functional properties of the IT artifact and another in which actualisation was loosely connected to the IT artifact and depended on social processes (Hausvik & Thapa, 2017, p. 14).

The emergence of organisational level actualisation from individual level actualisation journeys is identified by Strong et al. (2014) as an area for further research. Leonardi (2013b) provides useful insight into individual affordance actualisation and calls for greater attention to the understanding of group-level affordance actualisation. He identifies two categories of organisation-level affordance, collective and shared affordances (Leonardi, 2013b). A collective affordance is described as the aggregated or pooled affordances of individuals within a group in which different members use features of the system in different ways for the benefit of the group. A shared affordance is described as an affordance that is actualised by all members of a group in a similar way (Leonardi, 2013b, p. 752). Lehrig et al. (2017) found two group-level factors, advice networks and collective knowledge, to be included in path-dependencies for successful individual level actualisation of affordances offered by a collaboration platform.

Consistency, extent and alignment are identified by Strong et al. (2014) as measures of the emergence of organisational level outcomes. They pose questions for further development of these indicators of the potential for achieving organisational goals. Consistency is elaborated by Burton-Jones and Volkoff (2017) and Eden et al. (2018) in the context of effective use studies. Both studies found five types of consistency. In common between the two studies were consistency of form, consistency of meaning and consistency of place. Eden et al. (2018) named the remaining types of consistency Content which included completeness and accuracy, and Process which included variations in how the information technology was used in work practices. Burton-Jones and Volkoff (2017) identified Amount which included the level of detail input and could be interpreted to overlap in meaning with consistency of content proposed by Eden et al. (2018) and Utilization which included variation between staff in their use of given features of the information technology.

Much of the empirical research relating to affordance actualisation and the subsequent theory development has related to the use of Electronic Health Records in healthcare contexts (Anderson & Robey, 2017; Burton-Jones & Volkoff, 2017; Eden et al., 2018; Hausvik & Thapa, 2017; Strong et al., 2014). Strong et al. (2014) call for building additional mid-range affordance actualisation theories for other technologies in organisations (Strong et al., 2014, p. 80). Four studies investigate the affordances of knowledge sharing technologies in organisations (Dulipovici & Vieru, 2015; Giermindl et al., 2017; Glowalla et al., 2014; Lehrig et al., 2017). Case studies by Glowalla et al. (2014) and Lehrig et al. (2017) focus on contextual conditions and individual-level affordance actualisation. A quantitative study by Giermindl et al. (2017) is similarly focused on individual-level affordance actualisation with particular emphasis on non-use. A qualitative study by Dulipovici and Vieru (2015) examined group-level affordances of a knowledge sharing technology in a public organisation. They use two theoretical frameworks, social representations and sociomaterial practice perspective. The

current research aims to build on these studies using the affordance actualisation lens developed by Strong et al. (2014) with their mid-range theory as a template to investigate group-level actualisation of affordances for a public organisation using a knowledge sharing technology.

2.5 Critical Realism and Mid-range Theory

Volkoff and Strong (2013) demonstrate that the principles of critical realism provide a useful underpinning for theorising affordance actualisation in organisations. Critical realism has gained recent attention as a suitable epistemological perspective to bring to the study of open systems involving complex interactions between material and non-material systems (Henfridsson & Bygstad, 2013; Mingers, Mutch, & Willcocks, 2013; Volkoff & Strong, 2013). The promise of critical realism is "… the potential for researchers to identify the specific causes that explain the events we are studying" (Wynn , Williams, Volkoff, & Strong, 2013, p. 1). Identification of generative mechanisms is the means for achieving this (Bygstad et al., 2016; Leonardi, 2011, 2013b; Mingers & Standing, 2017; Volkoff & Strong, 2013). Bunge (2004 as cited in Henfridsson and Bygstad (2013)) gives this helpful definition " A generative mechanism is "one of the processes in a concrete system that makes it what it is – for example, metabolism in cells, interneuronal connections in brains, work in factories and offices, research in laboratories, and litigation in courts of law".

From this ontological perspective affordances can be understood to be a specific type of generative mechanism (Volkoff & Strong, 2013). Guidance for conducting critical realist analysis and for identifying generative mechanisms is provided by Wynn and Williams (2012), Bygstad et al. (2016) and Burton-Jones and Volkoff (2017). Generative mechanisms are sensitive to different contexts. The Theory of Organisation-EHR Affordance Actualisation (Strong et al., 2014) is a mid-range theory for actualisation of affordances relating to an electronic health records system in a healthcare setting. The original contribution of Strong et al. (2014) was to further define and extend affordance theory with respect to the process of actualisation and to adapt it for application in organisations. The value of mid-range theory is in the discovery of regularities in complex real world situations and in the depth and specificity of the associated empirical findings from which both researchers and practitioners can learn (Laughlin, 1995; Mingers & Standing, 2017)

Research methodology

3. Ontology and epistemology

I have adopted a critical realist ontological perspective for this research. This is in keeping with the work of Volkoff and Strong (2013) and their mid-range Theory of Organisation-EHR Affordance Actualisation (Strong et al., 2014). There are three key principles of critical realism which have implications for the research methods used in critical realist research. The belief in an existing real world independent of our knowledge, that our access to the real world is mediated by our perceptual and theoretical lenses and that a range of research methods is required to access knowledge of the world (Mingers et al., 2013, p. 796).

The concept of affordance maps to the stratified domains of the real from a critical realist perspective (Bygstad et al., 2016; Mingers et al., 2013; Volkoff & Strong, 2013; Wynn & Williams, 2012). The domain of the real includes structures such as language and natural objects that exist regardless of whether we can perceive them or not. Information, knowledge and information systems are examples of such structures. It is in this domain that there are mechanisms such as affordances that generate events or outcomes (Volkoff & Strong, 2013, p. 820). Nested within this domain is the actual where events and outcomes happen. It is here that affordances are actualised and in the case of this study knowledge sharing happens. The final domain is the empirical domain which is the subset of the actual that can be observed including outcomes of actualised affordances. This is the reality that is accessible to the researcher (Mingers et al., 2013). Cook and Brown (1999) illustrate these domains in relation to knowledge, "knowledge is a tool of knowing" they say, and "knowing is an aspect of our interaction with the social and physical world, and that the interplay of knowledge and knowing can generate new knowledge and new ways of knowing" (Cook & Brown, 1999, p. 381).

The organisation-EHR affordance actualisation theory proposed by Strong et al. (2014) is a mid-range theory that fits within the critical realist ontological paradigm. The theory includes eight organisational affordances, individual and organisational-level actualisation processes and dependencies among the affordances (Strong et al., 2014, p. 77). It relates to a specified information technology, an electronic health records management system, in the context of a healthcare organisation. Mid-range theories are frequently used to frame empirical research in information systems research and organisational studies (Bryman & Bell, 2015). The emphasis in mid-range theories is on explaining events and seeking regularities in these explanations that may apply in other similar instances (Mingers & Standing, 2017). Mingers and Standing (2017, p. 182) give the example of daily traffic jams at rush hour. Generalisations about reality such as this posed as mid-range theory are understood to be possible but not guaranteed to exist. They require specific contextual details to give them meaning just as a geographical location and time of day make sense of the traffic jam example (Laughlin, 1995). The value in applying a mid-range theory to a new context is to provide a structure that gives coherence to a complex socio-technical phenomenon such as affordance actualisation.

Critical realism offers a framework to make sense of the intangible relational phenomena in this study and to theorise what reality must be like for the observable events to have happened. It offers rigorous methods for research and analysis to address the research questions. By retrospectively

analysing events for which there is empirical evidence, the underlying structures and mechanisms in the case can be revealed.

4. Research design and method

A qualitative case study design was employed as a means to explore organisational knowledge sharing processes. Cook and Brown (1999, p. 398) call for more case studies investigating knowledge work and knowledge management within the situated practices of ordinary daily work. Inspired by the work of (Strong et al., 2014; Strong & Volkoff, 2010) this study was designed in such a way as to use the lens offered by their mid-range theory, the Organisation-EHR Affordance Actualisation Theory (Strong et al., 2014). In my study the affordance actualisation processes for a different technology, a knowledge sharing technology, were explored in a different organisational setting guided by this existing theory. Wynn and Williams (2012) identify the case study as the primary research design in the critical realist paradigm. A retrospective case study of a single organisation was chosen as a suitable means for contributing empirical findings that would provide insights into organisational knowledge sharing and contribute to the development and refinement of Affordance-Actualisation theory (Bryman & Bell, 2015, p. 71).

The Affordance-Actualisation lens was applied as a template for conducting the research (Strong et al., 2014). In keeping with the advice for critical realist researchers offered by Wynn and Williams (2012) this study sought to leverage the Strong et al. (2014) study to generalise their findings relating to dependencies between and among organisational affordance actualisation journeys. The theory provided a frame for structuring the study, containing the scope and guiding every aspect of the research design. The three measures in the theory, consistency, extent and alignment, offered a means of "seeing" emergent organisational affordance actualisations and for pulling them apart from what Strong et al. (2014, p. 75) describe as "the bundle of interrelated and interacting affordances". Two particular types of dependency identified by Strong et al. (2014) more precisely focused the study. These were temporal relationships and feedback loops. Three factors, technology features, individual characteristics and organisational context constituted actualisation processes from which feedback reinforced or restrained subsequent actualisation attempts. This theoretical perspective in turn shaped the research questions and the case selection (Wynn & Williams, 2012).

The questions focus the research on the process of actualisation asking how organisational knowledge sharing outcomes happened in the case and what might have caused them to unfold as they did (Strong et al., 2014). The Theory of Organisation-EHR Affordance Actualisation further focused the study on dependencies between and among the particular contextual conditions in the case which is in turn reflected in the questions. In this respect affordances and affordance actualisation processes are understood to be a particular type of generative mechanism with powers or liabilities that could cause the outcomes observed in the case. The questions shaped data collection which was designed to elicit properties of both the mechanisms and the context within which they operated (Mingers & Standing, 2017, p. 178). Data was needed that would reveal the five elements theorised by Strong et al. (2014) to give rise to organisational affordances. These are technology features, individual characteristics, immediate concrete outcomes, goal directed actions and organisational context. The concept of immediate concrete outcome is an important extension of affordance actualisation theory contributed by the Organisation-EHR Affordance Actualisation Theory. These outcomes may be said to be real, in the sense that they are concrete and that they occur in real-time when an actor uses the technology. Immediate concrete outcomes provide the feedback to actors from which they draw meaning which in turn shapes future practice. These would be critical to interpreting the case.

Two overriding considerations influenced the selection of the case. First it was necessary that the case organisation had knowledge sharing goals and had been using the knowledge sharing technology for long enough to yield sufficiently rich and detailed data relating to the five elements of organisational affordance actualisation as they related to knowledge sharing using technology (Bhattacherjee, 2012; Bryman & Bell, 2015; Strong et al., 2014). The organisation in many respects was selected due to its ordinariness and might be said to be representative (Bryman & Bell, 2015). The knowledge sharing technology in the study is ubiquitous in medium and large organisations in New Zealand in which so called knowledge workers have knowledge sharing goals. The second factor then became my access to the case intellectually as well as practically.

Critical realism recognises that the researcher's access to reality is always mediated and relative to historical, cultural and individual perceptual and theoretical lenses (Mingers et al., 2013; Mingers & Standing, 2017). My prior professional experience in the knowledge domain of the organisation and also with the technology object, added to the richness of the data that I was able to collect and gave me confidence to take on the difficult task of critical realist case analysis. My personal lens made it possible for me to get close to the participants in the study and to interpret events in order to theorise what reality must be like for the observable outcomes to have occurred and what generative mechanisms might explain them given the capacities of the Information System and the actors in the case (Mingers & Standing, 2017).

5. Case Site and Data Collection

The case study was conducted in 2018 in a knowledge intensive public sector organisation with approximately 1500 staff. The structure of the organisation was described as federal (SP positioning paper (Freeman, 2012, December) and consisted of five semi-autonomous business groups supported by centralised services in a hub and spoke model. Centralised services included IT, Finance, Property, Information and Records and Human Resources. The organisation used Microsoft SharePoint (SP) for organisational knowledge sharing. Data collection for this study focused on the Human Resources Department (HR).

Semi-structured interviews were the primary source of data collected for the study. Fourteen interviews were conducted in total. Preliminary interviews were held over a period of 3 months with staff from the organisation who held positions with responsibility for management of the knowledge sharing system or for managing knowledge sharing more generally. These interviews were informal and provided context for the case and helped to ascertain that the types of incidents relevant to the aims of the study would be elicited from HR participants. Ten formal interviews were conducted with participants from HR over a period of three weeks. An additional interview was conducted with a member of the IT department regarding technical management of the knowledge sharing platform.

When HR had been confirmed as the focus for the study and access to the organisation had been granted, a letter was sent to a contact within the department outlining the objectives of the research. The letter was forwarded to members of the department inviting them to volunteer to be interviewed for the study. Participants included at least one member from each of the four workgroups within HR. Interviews were face to face and ranged from 45 to 85 minutes. Interviews were recorded using a digital Dictaphone. Prior to recording participants were stepped through an information sheet and asked to sign a form giving their consent for the data collected to be used within conditions that would protect their privacy and only for the purposes of the research.

The critical incident technique was used by way of semi-structured interviews. This method was used to uncover context and capture characteristics of the participants in the study including their opinions and feelings about using the knowledge sharing technology in their work (Borgen, Amundson, & Butterfield, 2012). Participants were asked to recall past incidents or experiences and to describe them and to give examples where possible (Bryman & Bell, 2015; Volkoff & Strong, 2013). Particular emphasis was given to asking participants to describe the outcome of the critical incident. An interview guide provided an outline and prompts to ensure consistency in eliciting descriptions of events and outcomes in participants' experience with the knowledge sharing technology in achieving individual and departmental knowledge sharing goals. In keeping with Volkoff and Strong (2013) topics included –

- What do you use SP for?
- Explain the aim for this process?
- What are you trying to achieve as a result?
- Step me through the process? How do you do it?
- What did SP enable you to do?
- What happened once you started using SP

- Were there things that you expected to be able to do with SP that were not in fact possible?
- Is there anything you would change now that you've been using SP for knowledge sharing?

Field notes were taken during and after interviews. Saturation in critical incidents was achieved after ten formal interviews. Interviews were transcribed by the researcher.

Documentary research was used as another means for collecting data. Internal documents, Ppt presentations and the SP sites provided another source of information for corroborating self-reports and triangulation of data for improved internal validity of the research (Bryman & Bell, 2015, p. 400). SP product guides and technical details of the platform were sourced from the company website (Microsoft, 2018) and from Lynda.com training videos. Correspondence via email with an independent SP consultant and Microsoft MVP (Most Valuable Professional) provided another source for corroborating technical data.

Further data was abstracted from the case during analysis by retroduction. Bygstad et al. (2016, p. 89) describe retroduction as the "mode of inference in which events are explained by postulating (and identifying) mechanisms which are capable of producing them". The analytical task of the critical realist researcher is to start with that which is observable in the data, the empirical, and to abstract and uncover the ontological layers of the actual and the real that are unobservable but are believed to exist. The end goal is to understand and identify mechanisms that provide plausible reasons for the events that have happened in the case and for which there is evidence in the empirical data (Bygstad et al., 2016; Mingers & Standing, 2017). The Theory of Organisation-EHR Affordance Actualisation provided the lens for systematically and rigorously theorising generative mechanisms in the case (Wynn & Williams, 2012).

The concepts of individual-level immediate concrete outcomes and organisational-level concrete outcomes from the Theory of Organisation-EHR Affordance Actualisation provided a means by which affordances and their actualisation could be identified in the case data in relation to specific knowledge sharing goals of the organisation. The theoretical lens also provided the three indicators of the emergence of organisational-level affordance actualisation processes, consistency, extent and alignment which informed conjectures regarding the properties of mechanisms in the case and the context within which they operated (Mingers & Standing, 2017). The process of abstracting and analysing data from the case was intensive and iterative and is detailed in the data analysis section which follows.

6. Data Analysis

Data analysis and data collection are overlapping activities in critical realist case study research. The process of analysis generates insights that then become data in the case. All data that was collected and abstracted from the case, was cross-checked between sources and compared with research literature to ensure credibility of data that was generated (Borgen et al., 2012, p. 3). Applying the theory of Organisation-EHR Affordance Actualisation and drawing on the approaches of Wynn and Williams (2012), Bygstad et al. (2016), and Burton-Jones and Volkoff (2017) an adapted three step framework was developed to analyse the data in this case (See Table 1).

1. Explication of entities and events
    a. Describe the case including events and issues
    b. Understand the nature of the IT artifact
    c. Identify the relevant actors , their goals and the ultimate organisational goals
2. Retroduction
    a. Identify candidate affordances
3. Analyse the network of structures, mechanisms and events
    a. Analyse the set of affordances and extent, consistency and alignment of actualisation
    b. Analyse the network of affordances, their dependencies and feedback loops

Table 1: Adapted Three Step Framework for Critical Realist Case Analysis

Adapted Framework	Sources
1. Explication of entities and events	Wynn and Williams (2012). Explication of events. Bygstad et al. (2016). Description of events and issues. Burton-Jones and Volkoff (2017). Understand the nature of the IT artifact
2. Retroduction	Bygstad et al. (2016) Identification of candidate affordances
3. Analysis of network of structures, mechanisms and events	Burton-Jones and Volkoff (2017) Map out the network of affordances and the connections and feedback loops among the affordance outcomes

6.1 Step one: Explication of entities and events

The first step was to analyse the entities and events in the case to arrive at a detailed representation. Entities included the organisation, the HR department and the knowledge sharing technology. Events included moments in the history of the knowledge sharing technology within the organisation and the knowledge sharing goals of the organisation. Documentary research and transcripts of the interviews were the primary sources of data for this step in the analysis. The outcome of the analysis was a detailed description of the case which included a timeline of events and the high-level organisational knowledge sharing goals.

Interview transcripts contained data relating to self-reported critical incidents experienced by members of the HR department as they used SP in their work. Each interview was coded for technology features and organisational context including individual characteristics where they appeared in the data. Identified events, issues and entities were corroborated with the accounts of other participants and with details from technical SP documents and internal documents related to the implementation and management of SP in the case organisation. The entities in the case were multi-layered so that the knowledge sharing technology for example included the enterprise platform, group sites within the platform and knowledge objects stored in the system such as documents, data and metadata. While events need not be chronological a timeline did emerge beginning with the first application of SP and ending with the current focus on applying governance principles as part of a managed upgrade to SP 2013 (See Table 2).

Interview transcripts also contained responses to questions about higher level organisational goals for SP and the purpose for its implementation in HR and in the wider organisation. Knowledge sharing goals were extracted from these responses and confirmed and corroborated with data sourced from organisational strategy and planning documents.

6.2 Step two: Retroduction: Identification of candidate affordances

Having developed a rich and detailed understanding of the entities and events in the case, the next step in the analysis was to abstract mechanisms by retroduction. Understanding the generative mechanisms associated with structures such as information systems is central to critical realist epistemology. The concept of affordances helps to specify these mechanisms (Volkoff & Strong, 2013) . This process involved interpretation of the critical incidents reported by participants, checking assumptions by comparing the narrated experiences of multiple participants and cross-checking with internal documents, technical documents and relevant research literature. There was an element of imagination in taking observable empirical evidence and hypothesising mechanisms that might explain that outcome (Bygstad et al., 2016, p. 85). The Theory of Organisation-EHR Affordance Actualisation provided techniques and a structure for systematically and rigorously theorising affordances as generative mechanisms in the case (Wynn & Williams, 2012). The outcome of this step in the data analysis was a set of eighteen candidate knowledge sharing affordances in the case.

To be considered a candidate knowledge sharing affordance all five of the elements in the Theory of Organisation-EHR Affordance Actualisation had to be either evident in the empirical data or were hypothesised to exist based on my interpretation of the case. The five elements are technology features, characteristics of actors, example immediate concrete outcomes, goal-directed actions needed to actualise the affordance and applicable goals in the organisational context (Strong et al., 2014, p. 68). For example the candidate knowledge sharing affordance Linking required that the generation of durable hyperlinks was a feature of SP; that HR staff understood what a hyperlink was and were capable of clicking on the link, copying and pasting it, or bookmarking or saving the link; that there was evidence in the case that links to items or sites had been shared; that linking to content in SP had been carried out as part of a goal-directed activity by HR staff; and that linking to content in SP contributed in some way to an organisational knowledge sharing goal such as increasing opportunities for knowledge sharing across business units.

Immediate Concrete Outcomes provided the traces of possible knowledge sharing affordances as mechanisms in the case (Bygstad et al., 2016; Strong et al., 2014). A second round of coding identified Individual-level and Organisational-level Immediate Concrete Outcomes in the interview transcripts. These took the form of statements of knowledge sharing outcomes or achievements reported by participants that related to their own individual knowledge sharing goals or to organisational knowledge sharing goals and resulted from their using the technology. Candidate knowledge sharing affordances and actualised knowledge sharing affordances were extrapolated from these.

Labels were created to describe affordances that might be conjectured to result in observable immediate concrete knowledge sharing outcomes. The naming convention for affordances was followed by using a verb participle to describe the potential action (Volkoff & Strong, 2016). For example an Individual-level Immediate Concrete Outcome was *"access to documents for day to day work" [Interview 7]* which was labelled Accessing. An Organisational-level Immediate Concrete Outcome was *"Definitive repository for PDs [Position Descriptions] for the whole organisation" [Interview 2]* which was labelled using three different labels Capturing, Storing and Centralising.

Sixty-three labels were generated which included affordances as liabilities such as Blocking or Obscuring and powers such as Scaling or Mapping as well as others that may have been experienced as either constraining or enabling such as Controlling and Centralising. These were categorised to arrive at 18 candidate knowledge sharing affordances that related to the knowledge sharing goals of the organisation. For example labels for Announcing, Posting, Alerting, Reminding and Disseminating were categorised as the candidate knowledge sharing affordance Broadcasting and related to the organisational goal for staff to have opportunities for increased collaboration and knowledge sharing across business units. Understandably the organisational goals for knowledge sharing were articulated as desirable outcomes and so the candidate knowledge sharing affordances were all related to mechanisms as powers that might enable successful knowledge sharing rather than as liabilities that might constrain knowledge sharing.

Once more the data was interrogated for instances of Immediate Concrete Outcomes relating to each of the candidate knowledge sharing affordances to extract evidence to understand whether or not they had been actualised. The outcome of this step was a summary of the affordances for which there was evidence in the case that they had been actualised. The actualised affordances included candidate knowledge sharing affordances as powers as well as associated affordances as liabilities.

6.3 Step three: Analyse the network of structures, mechanisms and events

The final step in the analysis was to take all of the strands identified in the previous two steps and to look at them together to analyse the interactions and dependencies between them (Bygstad et al., 2016, p. 89). To this point the analysis had revealed a detailed description of the case including events (See Table 2), organisational knowledge sharing goals (See Table 3), candidate affordances that offered potential for action for HR staff (See Table 4), actualised affordances where there was evidence of the action itself along with the contextual conditions present for the individual HR staff member when they took the specific action (Volkoff & Strong, 2016). The next analytical task was to look for relationships and dependencies between these entities.

During this step in the analysis the contextual conditions reported by participants in narrating critical incidents were noted and further contextual conditions were hypothesised to exist based on my interpretation of the case. Together these conditions with the set of actualised affordances may be understood to be stimulating conditions that would have made it easier for HR staff in the case to act or releasing conditions that existed in the organisational context (Bygstad et al., 2016, p. 89). Assessment of the extent and consistency of actualisation of these affordances and alignment with organisational knowledge sharing goals was analysed as they relate to the interactions and dependencies between mechanisms in the case.

Once again The Theory of Organisation-EHR Affordance Actualisation (Strong et al., 2014) provided a lens for distinguishing pertinent relationships between all of these strands in order to see causes that would explain affordance actualisations in the case and consequences of actualising some affordances and failing to actualise others in achieving organisational knowledge sharing goals (Burton-Jones & Volkoff, 2017). In simple terms analysis at this step brought everything together to answer the question "How did that happen?". The theory guided identification of temporal dependencies between contextual conditions and organisational affordance actualisations to reveal the order in which organisational knowledge sharing affordances were actualised in the case. Furthermore the theory guided identification of feedback loops between the actions of individuals and immediate concrete outcomes of their actions as they learned how the knowledge sharing technology might be useful or conversely inhibiting in achieving their individual knowledge sharing goals. Finally the theory provided the three indicators of emerging organisational affordance actualisation consistency, extent and alignment.

In order to assess consistency, extent and alignment of affordance actualisation processes these concepts first needed to be defined. Consistency relates to "how well the actions of individuals considered jointly serve to actualise organisational affordances" (Strong et al., 2014, p. 73). Eden et al. (2018) and Burton-Jones and Volkoff (2017) developed the concept further noting that "some affordances don't arise unless workers act on prerequisite affordances consistently" they define consistency as "the lack of variation among instances of use of a given type" (Burton-Jones & Volkoff, 2017, p. 475; Eden et al., 2018, p. 3010). An example from this study illustrates inconsistency in actualisation of the Discovering affordance for which variation was found between the ways in which HR staff used SP in their work. One participant in the case found SP to be *"really really useful in that I can filter … and you can search" [Interview 2]* for Discovering while another participant found SP to have the opposite effect *"I struggle with it, with finding the right place and I was looking everywhere and I just couldn't find it and then I had to ask someone to send me through the link to it" [Interview 10].*

Extent similarly relates to the collective actions between individuals but rather than "how well" this indicator assesses "how far" the actualisation goes toward actualising desired organisational level immediate concrete outcomes (Strong et al., 2014, p. 73). Variation in the extent to which particular affordances are actualised may be caused by factors such as meaningfulness (Welschen, Todorova, & Mills, 2012), the amount of effort required (Anderson & Robey, 2017) or by other contextual conditions. An example from the case which illustrates extent of actualisation to achieve organisational knowledge sharing goals is the group-level affordance Communicating which was found to be actualised only to a slight extent. Communication outcomes were evident in the case in relation to the HR community site Chit Chat but not in relation to other SP sites used by HR staff.

The extent of actualisation of this affordance was such that it only contributed slightly to the organisational knowledge sharing goal to increase knowledge sharing across business units. When asked whether they used the Chit Chat site a typical response was *"Oh yes, yes we do. Well I don't, I haven't put anything on there cause we've got about 40 to 45 people in HR, a lot of people will put notices up there so like raffle tickets or you know I've got a spare couch does anyone want it, that kind of stuff. So we do do it. It's not, it doesn't happen all the time but everyone knows that it's there because everyone gets the alerts. So yeah that's quite a cool function of it [SP], and I think it probably could be used more to be honest". [Interview 4]*

Alignment relates to the contribution of an affordance actualisation to achieving long term organisational goals. This indicator takes a vertical view linking "the immediate individual and organisational level outcomes to longer term organisational goals." (Strong et al., 2014, p. 73). Again by way of illustration an example from this study was the actualisation of the Governing affordance which contributed directly to the long term organisational goal to improve statutory compliance as in this example: *"All [regulatory] processes are managed through the HR process which uses SP. All our documents are on a repository there" [Interview 5].* Furthermore the actualisation of the affordance Editing was also found to align with the long term organisational goal to improve statutory compliance but indirectly rather than directly *"There is huge benefit in knowing that the document that you are accessing is the latest version and whatever's in SP is the correct version that you are using" [Interview 4].*

The outcome of this step was a mid-range theory of Organisation-Knowledge Sharing Technology Affordance Actualisation.

Findings

The findings from the data analysis are presented in three sections following the three steps in the adapted stepwise framework. The first section Detailed Case Description gives a narrative description of the case detailing the organisational context, the nature of the knowledge sharing technology and the knowledge sharing goals in the case. The second section Retroduction presents candidate affordances as the generative mechanisms theorised to exist in the case. These candidate affordances are abstract and apply to HR staff generally. This section ends with a summary of the candidate affordances for which there is evidence of actualisation. There was evidence for both enabling and constraining actualisations in the case for specific HR staff taking actions to use SP in their work.

Finally the third section A mid-range theory of Organisation - Knowledge Sharing Technology Affordance Actualisation describes relationships between individual-level knowledge sharing actualisation journeys, group-level knowledge sharing actualisation journeys, contextual conditions and the dependencies found to exist between them in such a way as to explain what may have caused the observable outcomes in the case and answer the question "How did that happen?".

7. Detailed Case Description

7.1 Organisational Context

The case selected for the study was the HR department in a large knowledge intensive public sector organisation. The HR department provided services to around 15,000 staff across 5 semi-autonomous business units. Services included HR administration, Health and Safety regulation and compliance, Organisational Learning and Development and professional HR advisory support. At the time of the study the department consisted of 43 people including full-time and part-time staff, arranged into four functional teams all reporting to a Director of HR. The team experienced regular staff changes although two of the ten participants had served more than fifteen years with the organisation:

> *"We've got quite a large turnover in HR… we've almost got a whole new team." [Interview 4]*

Staff of the department were physically co-located in three adjacent open plan workrooms except for Senior Advisors and the Health and Safety Team who worked at locations that were physically separated from the rest of HR. The Health and Safety team had a shared workroom at a separate location and the Senior Advisors were distributed to be collocated with business groups for whom they provided advice:

> *"We've got the Health and Safety team that used to sit with us and they are part of HR but they're a team and now they're over at [another location] and that team's changed. It's funny since they sat with us there's nobody in, everyone's changed in that team, so they do feel quite separate now." [Interview 9]*

Senior Advisors also had a second reporting line to the directors of the business groups to which they provided advice:

"Structurally I am part of the HR team absolutely. I report into the Executive Director of Human Resources and I have a dotted line to [the Director of the business group]. *So that's the structure." [Interview 10]*

HR staff administered pay-related transactions, recruitment and offers of employment for all of the business groups in the organisation. HR Advisors provided professional advice regarding employment relations and HR practice such as recruitment, employment conditions and performance management. The department was responsible for implementing the Organisational Learning and Development strategy and the Health and Safety Policy for all departments of the organisation including for HR itself. These services were characterised as the business of HR and were delivered via the operational activities of HR staff on behalf of the organisation. In turn the department received services from other departments such as IT, Māori Development and Information and Records Management.

HR staff had a wide range of specialist skills and knowledge relating to their individual roles as well as knowledge of the organisation. Knowledge was intentionally managed in the department:

"Knowledge management [ ] is really capturing the procedures that we do and the things that we know, we do a lot of that". [Interview 8]

Knowledge sharing activities related particularly to capturing and storing knowledge in documents, spreadsheets, and images and deliberately introducing HR knowledge into the wider organisation through protocols, guidelines and processes:

"The minute you do a lot of operational stuff it's quite important that you have access to all the documentation that you can see what others have done and you can see a history and use the right templates." [Interview 10]

7.2 The Knowledge Sharing Technology

Microsoft SharePoint (SP) was the designated knowledge sharing technology used by the organisation. According to the product description (Microsoft, 2013) SP is a modular platform that enables storing, syncing and sharing of content (p. 6). It is claimed that "SP lets you share what you know with as many people as you want, whether they're in your department or in another country" (Microsoft, 2013, p. 28). The software provides design elements and navigation features that can be configured according to the objectives for each SP site. Site collections are hierarchical with child sites inheriting the settings attributed to the parent site. Content within sites is managed in libraries or lists and users are assigned roles with specified permissions for editing, contributing and reading. Integration with the Microsoft Office suite of personal productivity tools enables seamless upload and editing of content, synchronising of calendars and sharing of links to content via email.

SP was first introduced to the organisation in 2005 at a highly discounted rate under a public sector licensing agreement which gave all staff access to the enterprise features of SP as part of the wider Microsoft offering of software and application tools. (SP Positioning Paper 2012). Microsoft Enterprise Agreements are common in large organisations in both the private and public sectors. It is estimated that globally around 200,000 companies use Office 365 of which SP is a component, equating to around 160 Million users worldwide (Personal communication Microsoft MVP, 2018). Specific details for the number of users in New Zealand were not available however my source, an

independent SP consultant and Microsoft MVP, suggested that "Local Government tend to be a big user, with almost 100% of Councils using SP in New Zealand" and that the health sector "tended to be big users" estimating that "almost all District Health Boards use SP and more than 90% of Primary Health Organisations." Universities and other tertiary institutes were identified as another group using SP extensively. My source believed that all universities were using SP " and speculated that this might be due to Microsoft providing very low cost or even free licensing to education." (Personal communication) an idea that was corroborated in the data:

> *"I think it was just because it was this free product that they thought would be useful for doing collaboration."* [Interview 1]

Ease of procurement along with the devolved management model of SP were the two most notable factors in the adoption of SP by the organisation. One of the organisation's principles for managing information was that solutions should be devolved to those who create and edit content. SP made it possible for departments and business units to manage and maintain their own sites. Initially it was used predominantly within IT for projects and internal use described as testing for service enhancement (Freeman, 2012, December). HR were early adopters of SP within the organisation:

> *"I think it was probably just that everything was moving online and it was cumbersome and you knew that sending out pieces of paper for all the administrators to update a manual book was out of date and they wanted best practice as well." [Interview 8]*

SP offered the following features –

- Content management with metadata management and other content controls, integration with Microsoft Office personal productivity tools used for creating and editing content, as well as social networking and content collaboration and sharing features;
- Version control and the ability to share content via links rather than attachments;
- Search allowing content discovery by keyword searching or via metadata, as well as filtering by metadata tags such as people, content type or business function;
- Business Intelligence by presenting data in meaningful and accessible ways;
- Streamlined processes using configurable workflows with automated triggers for steps in the process; and
- Portals allowing sharing of information, data and expertise.

In 2009, 4 years after initial adoption, the platform was upgraded to SP 2007 to cope with the number of requests from departments across the organisation and to provide the potential for enterprise wide usage. SP became the preferred document management and collaboration tool for the organisation and off-site access was implemented giving staff full access to content anytime from anywhere. It was noted that increasing numbers of staff were changing their work practices to collaborate across departments and business groups creating demand for mechanisms to share and expose information.(Freeman, 2012, December) :

> *"There was a bit of an issue that there was an awful lot of all-staff emails going out and lots of them were deemed inappropriate. There were lots of communications where some people would be added in and others would be dropped off and you wouldn't get the whole conversation and so that was one of the drivers for using SP." [Interview 8]*

In 2012 the IT department prepared a case seeking support from senior management for greater investment in SP for the management of information and knowledge across the organisation. By this time 200 gigabytes of content was being managed in SP. Some departments had come to rely on SP while others did not use it at all. External events such as the global financial crisis of 2007 – 2008 and a period of significant earthquakes and ongoing aftershocks during 2010 - 2011 had disrupted plans for defining formal governance, training and support to leverage the knowledge sharing benefits of SP for the organisation. Issues identified were a lack of ownership of SP with no governing body and no service level or operating level agreements. There was limited or no support or training for end users of SP and there was no disaster recovery plan:

> *"It [SP] was given to us as, we weren't really going to have it. IT used it for some of their projects and we wanted something similar and so they said you can have SP to practice with and so we got it and nobody really knew what they were doing with it. There was no training and it wasn't official so we worked it out and it just morphed." [Interview 8]*

A further case was prepared the following year by the Chief Information Officer in cooperation with the director of the Information and Records Management department pointing out the risks to the organisation in failing to provide "a properly designed, cohesive and robust content management solution" such as SP could provide. Unstructured content was being poorly managed was not discoverable or re-usable, was not easily shared and was subject to loss posing significant risk to the organisation. "SP in its current state" they said "from a management and access point of view, is a less well-structured and more opaque document file share than it is a solution for managing and extracting value from the information assets it contains" (Registrar & CIO, 2013, May):

> *"When an environment's free for all you end up with huge amounts of artefacts or objects which have no understood value. So take our current SP 2010 environment, we have over 700 SP sites and of that less than 200 are in active use." [Interview 1]*

By the time of the study recommendations had been adopted resulting in the establishment of an Information Management Governance Committee, recruitment of a dedicated SP consultant, attention to technical and configuration issues, the development of a SP strategy and implementation of third party tools to support content management within SP. The organisation was in the process of upgrading to SP 2013 and implementing organisation wide information architecture. Consistent design and navigation would be applied to all SP 2013 sites according to a hybrid model of business function and organisational structure while still retaining devolved local site configuration:

> *"With our previous versions of SP they just grew as we needed stuff whereas with this one we've had the chance to step back and go how should we structure it, what should our information architecture be?" [Interview 8*]

Fifteen SP sites were administered locally by HR, accounting for 30% of the organisation's 50 active sites. Seven of these sites were for HR functions such as a Position Descriptions Library and HR Toolkit Document libraries containing master documents for managing the business of HR. There was a site for HR projects and a team community site:

"you can't lose sight of the fact that those two people [ ] are SP sort of evangelists in there in HR. If they weren't there I don't think HR would use SP as much as they do." [Interview 1]

HR administered a further six SP sites for managing and sharing knowledge between or across departments and business units of the organisation. One of the general HR sites had been delivered by an external provider as a dedicated customised solution to create a comprehensive digital repository of personnel files with appropriate security and regulation for managing sensitive records. The remaining fourteen sites administered by HR were built in house to meet various business needs as they arose.

Table 2: Timeline of Events		
Time	Event	Quote
2005	First instance of SharePoint for internal use and testing for service enhancement	It [SharePoint] was given to us as a, we weren't really going to have it. IT used it for some of their projects and we wanted something similar and so they said you can have SP to practice with and so we got it and nobody really knew what they were doing with it. There was no training and it wasn't official so we worked it out and it just morphed.
2009	SP confirmed as preferred document management / collaboration tool. SP sites become available from off site, providing full anytime / anywhere access	"There was a bit of an issue within the department that there was an awful lot of all-staff emails going out and lots of them were deemed inappropriate. There were lots of communications where some people would be added in and others would be dropped off and you wouldn't get the whole conversation and so that was one of the drivers for using SharePoint and using announcements and having that ability for people to opt in and out of communications and then go back and see what had been said and what had been communicated." HR Information Management Specialist
2012	HR Digitisation Site goes live	"We used to have all the [departments] had all their documents in different locations that no one had access to so no one could see anyone else's documents or know what they were doing or how they were doing it" HR Information Management Specialist Staff who needed to locate, review and update files had to physically go to where the files had been stored which was time consuming. Approximately half of the organisation's personnel files became inaccessible as a consequence of the building they were housed in having been placed off limits after an earthquake.
2013	Dedicated SP Consultant appointed	"It's helped that they've got a permanent person now cause up until I started there was no one that actually looked after it. It was pretty much installed and then we had people just come when they wanted stuff but they never actually ever had anyone here who cared about how [the organisation] itself was actually using SP."
2015	Governance structure implemented	"when an environment's free for all you end up with huge amounts of artefacts or objects which have no understood value. So take our current SharePoint 2010 environment, we have over 700 SharePoint sites and of that less than 200 are in active use". SharePoint Consultant "You have your application governance and then you have information and data governance." SharePoint Consultant "They've applied their records management strategies by function and you have to go to them to get a site created and they will force you then to go, no you can't call it that because that's not a function, it's two functions, so they're going to split it out…When you say I want a site, they say what sort of information is it, who's it for, why is it used, how long should we keep it, how important is it? and then they work with you."
2018	Preparation for upgrade to SP 2013	"So we have got a SP 2010 version and it's a bit organically grown and now we've got our 2013 version. They [HR Information Management Specialist and HR Information Management Coordinator] are really putting effort into the information design to make it function better and to make it a bit easier to find where things are." "With our previous versions of SP they just grew as we needed stuff whereas with this one we've had the chance to step back and go how should we structure it, what should our information architecture be?"

7.3 Organisational Knowledge Sharing Goals

The organisation's SP strategy stated the organisational objective for the knowledge sharing technology was "to establish SP as an integral and trusted platform to 'create-share-discover' knowledge and information and to connect with colleagues." (SP Strategy 2014-2016). Expected outcomes for the strategy were that SP would be trusted and well used, that it would support process efficiencies and improved compliance, that staff would have access to the information they needed from a range of devices and locations, that connections with stakeholder groups would be improved and that there would be increased opportunities for collaboration and knowledge sharing. "SP 2013 will be designed as a service where collaboration and information sharing is the norm, a service that breaks down and through silos, and one that enables and supports continuous improvements" (SP Strategy 2014-2016). High level organisational knowledge sharing goals to which HR contributed are summarised in Table 3 below.

SP was one of a number of knowledge sharing technologies in use within the organisation for example a learning management system was used in common across the organisation and business groups used a variety of digital asset management tools, alongside email, shared drives and social media tools. These technologies existed within a complex multi-layered knowledge sharing ecosystem. Non-technical mechanisms for knowledge sharing evident in the case were meetings, in person communication, informal sharing such as in the tea room and face to face training sessions. Knowledge was reported to be shared:

> *"Verbally or doing a face to face session" [Interview 10]*

> *"Through protocols and committees" [Interview 5]*

At the time of the study SP was the preferred knowledge sharing technology solution and the IT department would discount it first before considering alternative knowledge sharing technologies to meet organisational objectives.

Twelve principles for information management provided a framework that guided decisions regarding the application of SP to meet the information and knowledge sharing requirements of business units within the organisation. The principles included that information would be managed as a strategic asset for the organisation, that information management should not be treated as a technology problem, and should consider people, process and structures including metadata and that information systems should be user and task oriented in support of the organisations goals. Knowledge within this framework was not specifically defined and was interpreted to be propositional knowledge captured as information and in processes as well as knowledge maps and metadata:

> *"We can have a look at it literally it's a picture that maps [the content in the SP library]. So we have a big SP library and all our master documents, I think we've got over 2000 documents, are in the SP Library. We have all our process maps in that big document library as well and we have heaps of metadata". [Interview 3]*

Information systems principles in the framework included that they should support innovation and creativity and where required provide assurance of compliance with statutory requirements and that

sensitive and personal information would be protected. Processes were a means of sharing and developing HR knowledge across business units and for guiding and controlling practice:

> *"a lot of their processes are manual and involve double handling and also they are very dependent on people outside HR doing their bits correctly so by using SP they can enforce rules and procedures that are very hard to do with bits of paper". [Interview 1]*

Another information principle was that users of information systems should have confidence in the authenticity, accuracy and currency of information which should be available to permitted staff at anytime from anywhere including in the long term future.

Table 3 : Organisational Knowledge Sharing Goals
Staff have access to the information they need from a range of devices and locations
Staff have opportunities for increased collaboration and knowledge sharing across business units
Business units develop process efficiencies
Statutory compliance improved

8. Retroduction

This section reports the findings of the analytical process of retroduction. Bygstad et al. (2016, p. 89) describe retroduction as the "mode of inference in which events are explained by postulating (and identifying) mechanisms which are capable of producing them". Three types of mechanisms are described here. These are affordances, actualised affordances and contextual conditions which are postulated to have powers or liabilities that enabled or constrained actualisation of knowledge sharing affordances in the case.

8.1 Candidate Knowledge Sharing Affordances

The affordances presented here as findings are postulated as candidate knowledge sharing affordances in the case. Paraphrasing Volkoff and Strong (2013, p. 823) they have the potential for behaviours associated with achieving immediate concrete knowledge sharing outcomes and arise from the relation between the knowledge sharing technology (SP) and a goal-oriented actor or actors in HR.

Eighteen candidate knowledge sharing affordances were identified (See Table 4). To qualify as a candidate knowledge sharing affordance all five of the elements in the theory of Organisation-EHR Affordance Actualisation were either evident in the empirical data or were hypothesised to exist based on the data in the case. The five elements are technology features, characteristics of actors, example immediate concrete outcomes, goal-directed actions needed to actualise the affordance and applicable goals in the organisational context (Strong et al., 2014, p. 68).

Some of the affordances have more granular nested affordances that have been categorised under a single affordance label such as Discovering which includes the affordances Searching and Filtering. Conversely some of the affordances could have been aggregated into a higher level affordance. For example Editing which is identified as a candidate affordance could have been considered a type of Contributing and therefore nested within that affordance. Decisions as to which level of abstraction to present candidate affordances was determined by the evidence in the case.

Table 4: Goal Directed Action Possibilities Using SP Features to Achieve Organisational Goals	
Candidate Affordances	**SP features**
Goal : Staff have access to the information they need from a range of devices and locations	
Contributing	Content can be uploaded or created within the platform using integrated Microsoft productivity tools such as Word, Outlook and Excel
Editing	Content in the system can be updated and edited for accuracy to ensure consistency, currency and confidence in the relevance and integrity of the content
Storing	Content such as documents, images, spreadsheets, presentations, process diagrams, email communications and unstructured data can be stored in a centrally managed repository
Accessing	Users who are permitted can obtain access to content when they need to use it from anywhere using a range of devices available to them
Discovering	Users can filter or search using keywords and metadata to discover content for awareness or reuse
Browsing	Navigation features can be used to discover content for awareness or reuse
Linking	Stable hyperlinks to individual items or sites can be bookmarked, saved as favourites, included in documents or shared via email
Goal: Staff have opportunities for increased collaboration and knowledge sharing across business units; and Business units develop process efficiencies	
Describing	Users can add annotations and metadata tags to provide information about content and context to support sensemaking
Structuring	Unstructured content can be organised according to user defined labels and categories for customised display by individuals or at site level to show relationships between content
Standardising	Consistent design principles, identity management, permission rules and information structure enable systematic information and knowledge sharing practice across the organisation
Co-authoring	Multiple users can simultaneously write or edit in a single document, list or site. Version histories are visible showing the development of content and providing access to earlier versions for comparison or reuse. Check-in, check-out and document finalisation features enable authors to assert point-in-time management of content
Communicating	Social networking capabilities enable users to connect and interact to contribute and respond to information, news or ideas
Broadcasting	Notification of changes such as new content or updating can be automatically sent to predetermined groups of users in real time. Users can opt in or opt out of notifications
Centralising	A single platform for use by all staff across a physically dispersed organisation reducing duplication of effort and allowing substitution of staff with similar functions and shifting of work across roles
Monitoring	Information relating to activity and content within the system is visible such as who is permitted to access content, who has accessed it, when for how long and how often which enables analysis and generates information for management and coordination
Automating workflows	Configurable workflows enable automation of tasks based on business rules which can increase consistency and traceability, and reduce effort, time taken and risk of human error
Goal: Improved statutory compliance	
Securing	Permissions can be managed to authorise access to particular content or sites for individual people or categories of people according to their roles within the organisation assuring privacy and regulatory compliance
Governing	Enforcing policies, protocols and business rules and permitting or preventing actions available to users depending on their allocated roles and the purpose for the organisation in managing particular content

The candidate affordances are grouped and presented in relation to the stated knowledge-sharing goals of the organisation and with selected empirical references from the case data. They are presented in three categories; individual-level candidate affordances, group-level candidate affordances and organisation-level candidate affordances. In the first category seven candidate knowledge sharing affordances are identified that offer individual-level action possibilities and relate to the organisational knowledge sharing goal that staff will have access to the information they need from a range of devices and locations. These are Contributing, Editing, Storing, Accessing, Discovering, Browsing and Linking.

In the second category nine group-level knowledge sharing affordances are identified. They offer action possibilities to groups of HR staff or HR staff together with staff of the organisation from other business units. These affordances have the potential to achieve the organisational knowledge sharing goals that staff will have opportunities for increased collaboration and knowledge sharing across business units and that business units will develop process efficiencies. They are Describing, Structuring, Standardising, Co-authoring, Communicating, Broadcasting, Centralising, Monitoring and Automating Workflows.

The final category identifies two organisational-level candidate knowledge sharing affordances that offer action possibilities for individuals or groups of individuals and collectively have the potential to contribute to the organisational goal to improve statutory compliance. These are Securing and Governing.

8.2 Individual-level candidate knowledge sharing affordances

Candidate affordances in this category are potentials for action with respect to the goals of HR staff and arise from their relation with SP as they conduct their work. Seven individual-level candidate knowledge sharing affordances were identified in the case and are listed below.

Contributing

The Contributing affordance enables the possibility for HR staff to contribute what they know to HR processes and to HR related documents as they work on HR related activities such as recruitment, administration of pay and leave, health and safety compliance etc. They can upload documents to SP or they can contribute directly to spreadsheets, lists or libraries using integrated Microsoft productivity tools such as Word, Outlook and Excel or features of the SP platform:

> *"I would go click on the link to the spreadsheet page and then add it on … I'd put in the title, the job id, the position number that the person will take on when they get the role, the area [business unit] the HR administrator, the HR Advisor on it, the hiring manager, so if anyone stepped in they'd be able to know who to talk to about the role if they needed to, the closing date, what sort of salary they'll get and whether it's a role that falls under our Vulnerable Children's Act because that requires extra bits and pieces that have to be done along the way in the recruitment process." [Interview 6]*

Editing

The Editing affordance enables the possibility for HR staff to reuse document templates or update content in SP acting on new knowledge that they generate in their work or responding to changes in their operating context that impact HR activities such as each new recruitment process, policy changes or legislative changes. Documents, lists or metadata can be amended according to the requirements of the change or for accuracy, consistency and currency and to ensure confidence in the relevance and integrity of the content. Editing has the benefit of removing redundant content by updating:

> *"When they [HR administrators] were moved away we had to do everything electronically so there had to be a way in which you could access the draft files that they were creating and be able to amend those drafts electronically so that then they could upload a pdf version of the final draft. So that certainly made life a lot easier otherwise you'd be getting copies as attachments doing something with it, sending it back and fluffing around with it which would be cumbersome. [Interview 7]*

Storing

The Storing affordance enables the possibility for HR staff to save and store documents and other artifacts created in their work as required for record keeping, collaborative working, knowledge sharing or for managing processes over a period of time. Stored content can be saved to a centrally managed SP repository where it may be visible to staff from within HR or from other Business units of the organisation. Knowledge artifacts may include documents, images, spreadsheets, presentations, process diagrams, email communications and unstructured data:

> *"Everything is on there, everything, everything" [Interview 10]*

Accessing

The Accessing affordance enables the possibility for HR staff and sometimes staff from other business units of the organisation to access information and knowledge that they need in the conduct of their work. Knowledge accessible from SP includes templates, forms, master documents, guidance documents, policies, protocols, records, data, metadata and active process documents. Using the organisation's technical infrastructure content stored in SP can be accessed anytime from anywhere using a range of devices:

> *"[I] access mostly HR documents that support my day to day activities … I am able to go in and access the stuff that's specific for me to be able to get to the material that's sitting there relating to whatever portfolio I might be after at the time." [Interview 7]*

Discovering

The Discovering affordance enables the possibility for HR staff and sometimes staff from other business units of the organisation to discover information and knowledge stored in SP by filtering or searching. Filtering enables discovery of content based on known metadata tags such as position number or department code. Searching enables discovery of content using keywords such as the

names of people or processes. Information or knowledge may be discovered that was previously unknown or that was known and is needed again to complete HR activities.

> *"… there is all the PDs [Position Descriptions] on there and I can filter around salary bands or departments… The other really good thing is you can just look up a PD and you can search for a name or a position title …" [Interview 2]*

Browsing

The Browsing affordance enables the possibility for HR staff and sometimes staff from other business units of the organisation to find the information or knowledge that they need for their work in the SP platform using navigation features such as headings and web parts. SP navigation features can be configured to represent knowledge in SP in such a way as to be meaningful to the HR staff using it for their work:

> *"We've come up with the left hand navigation with really helpful headings." [Interview 9]*

> *"So if nothing else you've always got that left hand the same and you can pretty much get to anything you need to and if you don't know where you are it's not hard to find [your way] back to where you want to go." [Interview 9]*

Linking

The Linking affordance enables the possibility for HR staff and sometimes staff from other business units of the organisation to use stable hyperlinks to connect to and share specific information or knowledge in SP in conducting their work. HR related content such as guidelines for approving leave or forms to request to recruit can be transferred directly to a recipient in a business unit by sending a link. HR staff can use links to bookmark frequently used content for ease of access. Hyperlinks can be bookmarked, saved as favourites, included in documents or sent via email:

> *"I know exactly what's in there, I know what I'm looking for when I get there, I know that other people don't have an excuse to not know where it is because they've got the same link, the same information that I have right in front of me." [Interview 6]*

8.3 Group-level candidate knowledge sharing affordances

Candidate affordances in this category are potentials for action with respect to the goals of groups of staff. They arise from the relation of individuals with SP as they conduct their work which when aggregated have the potential to realise collective outcomes that contribute to group-level goals. Much of the work of HR was conducted on behalf of or in collaboration with other staff of the department or with staff from other business units of the organisation and required their input to complete HR activities and achieve HR goals. Group-level affordances have the potential to contribute to the organisational-level knowledge sharing goals for staff to have opportunities for increased collaboration and knowledge sharing across business units and for business units to develop process efficiencies. Nine group-level candidate knowledge sharing affordances were identified in the case which are listed below.

Describing

The Describing affordance enables the possibility for HR staff to record and share their knowledge about HR information and knowledge contained in SP. Descriptions may take the form of metadata, version histories or annotations and can provide additional information regarding the specific context for decisions or variations represented in the information or to explain the reasons for changes to content. For example a change to the banding of a position description to accommodate increased responsibilities in a role or changes in a protocol in response to new regulations might be described so that others can know and make sense of the information and knowledge in SP:

> *"we're using version history so I can type comments in what's been done why it's been done add metadata and publish it" [Interview 3]*

Structuring

The Structuring affordance enables the possibility for HR staff and sometimes staff from other business units of the organisation to change the way that content is displayed in SP according to their knowledge seeking purpose. Views can be created and saved or configured for each use such that content in lists or libraries is sorted and displayed according to chosen data points to enhance knowledge sharing and gain new insights from the data. For example an HR recruitment administrator may structure a list of vacancies by date in order to know when recruitment activities need to be actioned whereas an HR Advisor based in a business unit may structure the same list according to salary band in order to know the financial implications of the same recruitment:

> *"I know that I can go directly to a document library and I can filter or create a view that's helpful to me in the way that I work. It might not be the same as how that other person likes to view a library or a bunch of documents but I can choose how I view these things". [Interview 9]*

Standardising

The Standardising affordance enables the possibility for site designers to configure SP sites on behalf of groups using consistent design principles, identity management, permission rules and information structure, and for individuals within groups to learn these standards for representing knowledge in SP for a common understanding that is meaningful to them:

> *"We have our 10 Toolkit drawers you know the life cycle of a staff member and that goes through everything, everything is grouped into those 10 topics. There was a big working group to work that out and they had everybody in the department and outside people, it was a big exercise to decide and there were lots of arguments and lots of 'where would you put that' and I still get confused. Like is it 'reward and recognition' or 'professional development'. At some stage you have to go this is it and this is where it goes and it works pretty well. It does flow quite well now." [Interview 8]*

Co-authoring

The Co-authoring affordance enables the possibility for groups of HR staff or for HR staff in collaboration with staff from other business units of the organisation to simultaneously contribute their knowledge to a shared document, list or site. Version histories can make changes visible to multiple authors and readers to show the development of content and to provide access to earlier versions for comparison or reuse. Check-in, check out and document finalisation features enable authors to assert point-in-time management of content:

> *"We have a process called the Kia Ngari Ngari process and that uses SP as a place where it can link all of us to contribute and have access in one place, so here there's HR and there's the Māori Development Team. We work really hard together to really ramp up the te reo in adverts and position descriptions and things like that." [Interview 6]*

Communicating

The Communicating affordance enables the possibility for HR staff to use social networking capabilities in SP to develop online communities of practice and to connect across organisational boundaries and interact by contributing and responding to news, ideas or information:

> *"We set up Chit Chat as a sort of announcements area for messages that were outside of business as usual. Then from there it had an area where we could upload photos so we started uploading photos which was fun. We did surveys 'what shall we do for Christmas?' then if somebody would bake a cake and everyone would want the recipe then you'd put it in SP so that anybody who wants it can get it. So it's that communal place for sharing." [Interview 8]*

Broadcasting

The Broadcasting affordance enables the possibility for HR staff to notify changes to information or knowledge in SP to other HR staff or staff of other business units of the organisation. Changes may be the addition of new content, the removal of redundant or outdated content or changes due to editing of content. Notifications can be automatically sent to predetermined groups of users in real time as a means of deliberately raising awareness or introducing knowledge to recipients across the organisation. Users can opt in or opt out of notifications:

> *"Every time I make a change to a process, they have built me an announcement section here, and I say what I've done and if it's major or minor. It's got all of the information and it's got the process map and I say what it is, I save it and it pings automatically a forced note to all HR users". [Interview 3]*

Centralising

The Centralising affordance enables the possibility for HR staff physically dispersed across the organisation to work together using a single online platform. Centralising can reduce duplication of effort and allow substitution of staff with similar functions. It can also enable shifting work across roles:

> *"Now everything is open, we're all on the one [platform] we all have the same access, we can see what other people are doing and you can step into other people's roles if someone's sick. We've got consistency of naming and where we file things". [Interview 8]*

Monitoring

The Monitoring affordance enables the possibility for oversite by HR staff or by staff from other business units of the organisation of content and activity in SP. Monitoring of particular content or sites enables visibility of knowledge contribution and knowledge access and generates new knowledge about the information and knowledge in SP and how it might be being shared and applied in the organisation:

> *"I think it could have a really really good role and it also could be a good way to collect data on how many people who are actually interested in it. So it could generate quite a bit of data from a strategic point of view, could provide quite a bit of information on 'how has usage of this specific SP site increased, are there specific things?'" [Interview 10]*

Automating Workflows

The Automating Workflows affordance enables the possibility for site designers to configure workflows on behalf of groups of HR staff or HR staff together with staff of other business units of the organisation based on business rules in order to automate regular or repeated tasks. Workflows enable knowledge captured as business rules to be embedded and automated in processes in SP. This affordance contributes to the organisational goal for business units to develop process efficiencies and can increase consistency and traceability while reducing effort, time taken and risk of human error:

> "*That whole workflow feature in the background, cause it's a workflow sending the documents from the main library to the published library, that whole thing in the background's just such a huge time saver for us and it lowers the risk of the latest version not being out there". [Interview 9]*

8.4 Organisation-level candidate knowledge sharing affordances

Candidate affordances in this category are potentials for action with respect to the goals of the organisation. As with individual-level and group-level candidate affordances they arise from the relation of individuals with SP as they conduct their work. Organisation-level candidate knowledge sharing affordances may or may not be dependent on the actualisation of affordances from lower levels in the organisational structure. These dependencies will be discussed in the next section. Organisation-level affordances have the potential to contribute to the knowledge sharing goals for

improved statutory compliance. Two organisation-level candidate knowledge sharing affordances were identified in the case which are listed below.

Securing

The Securing affordance enables the possibility for authorising or preventing access by HR staff or staff of other business units of the organisation to particular content or sites. Knowledge of the roles of individual staff or categories of staff can be embedded in permission settings for information and knowledge security to control practice thereby assuring privacy and regulatory compliance:

> *"I mean the sharing of PDs [Position Descriptions] that's like general knowledge really. So we've got, and this is different, we've got a new system in HR, HRPF [Human Resources Personnel Files] so that's where all, everybody's employment records and things like that are. Should they be seen by everybody? No, so that's different". [Interview 2]*

Governing

The Governing affordance enables the possibility for HR staff or staff of other business units of the organisation to promulgate policies, protocols and business rules in SP on behalf of the organisation. Permitting or preventing actions available to users of SP depending on their allocated roles and the purpose for the organisation in managing particular content enables Governing:

> *"[Specialist knowledge is shared] through protocols and committees, which only extends so far. I've produced [some] of the most unstimulating subject matter you could ever think of and I know I have but what I've clearly defined is the instruction from [the organisation] to those people [doing the task] how to do it correctly and I've addressed every part of that". [Interview 5]*

9. Actualised Knowledge Sharing Affordances

There was evidence in the case that seventeen of the eighteen theorised candidate knowledge sharing affordances had been actualised at least to some extent and that they had powers that enabled organisational knowledge sharing goals. The remaining candidate knowledge sharing affordance, Browsing, was found to constrain knowledge sharing in the case and not to enable it. Eight of the candidate affordances including Browsing, were found to result in unintended outcomes and were experienced by HR staff as liabilities that constrained knowledge sharing. To differentiate these two potentials, the constraining potential for these affordances are described as liabilities. They have been labelled Impeding discovery, Complicating, Obscuring, Decontextualising, Blocking, Spamming, Misinforming and Excluding. Furthermore eight of the candidate affordances were found to be absent for particular actors in the case. There was evidence to support the existence of these affordances in the case and also that they were either not perceived or not acted upon by some HR staff in their knowledge sharing practice.

9.1 Actualisation of Individual-level Candidate Knowledge Sharing Affordances

Six out of the seven theorised individual knowledge sharing affordances were found to have been actualised at least to some extent. These were Storing, Contributing, Editing, Accessing, Discovering and Linking. There was no evidence of immediate concrete knowledge sharing outcomes for the candidate affordance, Browsing. This may mean that the Browsing affordance was not actualised or simply that evidence of actualisation did not appear in the case data. There was however evidence of an associated liability which was labelled Obscuring. There were examples of immediate concrete knowledge sharing outcomes for the Storing affordance at the individual level, group level and organisational levels. The Storing affordance was unique in this respect. There was no evidence for Storing as a liability.

The Contributing affordance was found to have been actualised at the individual level and the group level. There was no evidence for Contributing as a liability however it was found to be an absent affordance that had not been acted upon by at least one participant:

> *"Like the PD [Position Description] library, we have all our PDs in there but what most of [us] do is actually to save them on our own drives." [Interview 4]*

The Editing affordance on the other hand, which may be considered a particular type of contributing, was found to have been actualised at the individual level in such a way as to have been enabling for some knowledge sharing activities and constraining for others:

> *"There is a huge benefit in knowing that the document that you are accessing is the latest version and whatever's in SP is the correct version that you are using." [Interview 4]*
>
> And on the other hand:
>
> *"We find it hard tracking the different versions of a document in SP. So if an administrator were to use the PD library, upload the base document, then to actually save additional layers on top of that when they've made changes, that's I think where we fall over … [and] Most of the time PDs are always urgent so we need to get them turned around fast, so we just go*

well actually let's forget about it and we'll just put the final version up there once all the changes have been made." [Interview 4]

The liability associated with Editing was labelled Complicating. The steps involved in Editing to update content in SP was found to complicate the process for updating and therefore constrain contributions to knowledge sharing goals.

The Accessing affordance was found to have been actualised at the individual level with enabling powers. There was no evidence of Accessing having constraining powers in the case however it was a missed affordance for some members of HR staff due to their not perceiving it or not acting upon it in their knowledge sharing activities:

"It's fascinating you know we had a [staff member] and they'd been here for years and they'd never been into SP and I thought how do you do your job, how can you function without going and getting this information, which is quite mind blowing." [Interview 8]

The Discovering affordance was found to have been actualised at the individual level with both enabling and constraining powers. The liability associated with Discovering was labelled Impeding discovery. HR staff and sometimes staff from other business units in the organisation were found to have been unsuccessful in discovering content using the filtering and searching features of SP. Rather than relating with these features in ways that were enabling, participants and other users in the case were reported to experience this potential as constraining their contributions to knowledge sharing:

"Everyone's 'oh it's too hard, I'm not going in there, can you just send me the link?'" [Interview 6]

The Linking affordance, which may be considered a particular type of Discovering, was similarly found to have been actualised at the individual level with both enabling and constraining powers. The liability associated with Linking was labelled as Decontextualising. As with the Discovering affordance the Linking affordance had potential for enabling participants to find content in SP however reliance on Linking had a constraining effect on their potential to discover content:

"A lot of the experience that our users have […] is with document libraries and where our documents are stored and because a lot of our documents are just linked from the HR Toolkit intranet site they don't really see where they sit in the background. They may never visit this document library that holds all these documents. They just click on the link and it takes them to the document they want. So they don't really see or understand how they're stored or how they could view or find documents in different ways." [Interview 9]

The Obscuring liability, associated with the theorised Browsing affordance, was found to have been actualised at the individual level with constraining powers. There was evidence that HR staff and staff from other business units of the organisation had been unsuccessful in using SP navigation features, as they had been configured, for finding the content they needed in their work:

"So if I logically thought to myself well I would look in the procedure called 'interview', if it wasn't there I would be stumped and that's what happened sometimes. We've gone to look

for something and it's not where you would think it should be, so then you're like 'I have no idea where it might be'" [Interview 6]

9.2 Actualisation of Group-level Candidate Knowledge Sharing Affordances

All nine of the theorised group-level candidate knowledge sharing affordances were found to have been actualised in the case at least to some extent. Three of these affordances were found to have constraining as well as enabling potential for individual actors in the case. These are characterised as associated liabilities. They have been labelled Blocking, Spamming and Misinforming. The six candidate affordances for which there was evidence of immediate concrete group-level knowledge sharing outcomes but for which there was no evidence of associated liabilities were - Describing, Structuring, Standardising, Communicating, Centralising and Automating Workflows. All of these were found to be absent affordances for at least some of the actors in the case in their use of SP for knowledge sharing. There was insufficient evidence in the case to ascertain whether participants had not perceived these candidate group-level affordances or whether they had been perceived but not acted upon.

Co-authoring, Broadcasting and Monitoring were found to have enabled immediate concrete group-level knowledge sharing outcomes:

*"You can be kept up to date easily by setting alerts on all the areas that matter to you. You can see when people are uploading documents and changing things and doing all that sort of stuff. You can communicate with everyone more easily and then keep track of your communication." [*Interview 8]

On the other hand there was also evidence that the same three affordances were experienced as liabilities in particular instances in the case.

The Co-authoring affordance was associated with the Blocking liability. There was evidence of successful knowledge sharing outcomes generated by HR staff collaborating to simultaneously contribute to a shared document. At the same time some actors related with the co-authoring features of SP in such a way as to block the contributions of others:

"The issue that we'd run into is people not checking it in, or thinking is has been checked in and then you can't access it. We've got a lot of part-time staff within HR so a lot of the time it happens when people aren't around and so there's no way of checking in so you have to wait until the next day to get access to the document which isn't ideal." [Interview 4]

The Broadcasting affordance was associated with the Spamming liability. As with the Co-authoring affordance there was evidence that the successful actualisation of Broadcasting by some actors was at the same time experienced as constraining by others:

"I think SP can be very useful but I get so many notifications when it comes to SP changes it's becoming a nuisance. My feeling about SP are negatively influenced by all those notifications left right and centre." [Interview 10]

The Monitoring affordance was associated with the Misinforming liability. While Monitoring was found to enable oversite of content and activity in SP such oversite was found to be Misinforming in

some instances as the content or activity in SP did not give a true or accurate representation of the reality in the case:

> *"We've got an HR calendar [in SP]. The purpose is for people to record their leave so everyone has oversite of what's going on but probably only a handful of 40 people use is so it's not very accurate." [Interview 4]*

9.3 Actualisation of Organisation-level Candidate Knowledge Sharing Affordances

There were two organisational-level candidate knowledge sharing affordances theorised to exist in the case, Securing and Governing. Evidence for the actualisation of both of these candidate affordances was found in the form of immediate concrete organisational-level knowledge sharing outcomes. The Securing affordance was also found to have a constraining potential. This associated liability has been labelled Excluding.

The successful actualisation of Securing in relation to HR content within SP was found to contribute to the organisational knowledge sharing goal to improve statutory compliance. At the same time it was found to be a liability with constraining effects on other aspects of HR knowledge sharing practice. Staff from other units within the business were found to be excluded from SP content as a result of Securing which in turn constrained potential for knowledge sharing:

> *"My understanding is that we don't share, our SP's locked down […] The difficulty I have with SP is that if I want to send my managers [in other units within the business] a PD I have to save it to my desktop and then I send it because I can't send it straight from there and they can't access it which is a little bit annoying." [Interview 2]*

9.4 Contextual Conditions

Sensemaking

Actualisation of higher-level organisational knowledge sharing affordances in the case depended upon participants being able to make sense of the affordances available to them in relation to SP within the wider meaning system of their work. It was possible for actualisation of some affordances to be required of HR staff as part of a strictly monitored process and therefore to be enacted as mechanical tasks that just had to be done. However actualisation of higher-level organisational knowledge sharing affordances required that SP should have a role in holding and generating a body of knowledge for the group. A shared mental model for interpreting affordances was necessary for negotiating and configuring SP in such a way as to provide knowledge sharing affordances to the group.

Apparent in this case was the different role of sensemaking in two different pathways of organisational knowledge sharing affordance actualisation. For the organisational-level affordances the frame for sensemaking was provided by the organisation. The mental model for making meaning which in turn guided practice was an integral component of the affordance. The ten stage HR lifecycle which framed and guided HR practices throughout the case organisation was an example of structured sensemaking. The function of the sensemaking model applied to all actors in the organisation and was strictly controlled by staff who's roles it was to guide HR practice.

Upward sensemaking was much more complex and required individuals on a collective level to construct and maintain shared mental models for connecting organisational knowledge sharing affordances in relation to SP within the wider meaning systems of their work. There was evidence in the case of frustration as a result of not being able to make sense of information and knowledge as it was represented in SP. The devolved management model of SP in the case indicated an intention to support the level of information democratisation required to achieve upward actualisation of organisational knowledge sharing affordances.

> *"it's really very chaotic I think. They have a SP site for this, for this, for that and no real definition, alright so if I look for instance for one specific document about problem A where do I find it? Do I have to go to development? do I have to go to ER? where is it. So I think it lacks vision." [Interview 10]*

Prior knowledge

A characteristic of the case was the organic nature of the organisation's deployment of SP. This resulted in variation across the organisation in terms of local site level implementations of SP and across time as the platform evolved. Prior knowledge of these iterations of SP in the organisation was found to interrelate with affordance actualisation journeys. Individual learning from feedback received from immediate concrete outcomes of interactions with earlier configurations of SP shaped what HR staff knew about SP and the possibilities it might afford them in their work. The nature of the deployment meant that early iterations were often experimental and incomplete. Knowledge formed based on these early experiences was found to have influenced perceptions and therefore affordances of SP and to have restrained individual knowledge sharing actualisation journeys. On the other hand at least one of the participants had experience of using SP at another organisation in a previous role with similar HR responsibilities. Prior knowledge in this instance was similarly restraining but due to frustration caused by transferring expectations of what had been possible using SP in another organisation to the SP configuration in the case organisation:

> *"it had a lot of interactive online forms to do audits etc so you could go round with a tablet on site and as long as you knew the part of [it], and you were authorised to do that for the site it worked really well and it was also open [ ] which SP is not open here." [Interview 5]*

Also apparent in the case was evidence of transferring of prior knowledge of other information systems used previously for elements of the work for which SP was now being used. An example of prior knowledge of another information system restraining actualisation of organisational knowledge sharing was in relation to storing information and knowledge. Expectations for contributing, storing and accessing information and knowledge based on prior knowledge of the organisation's shared drive frequently caused HR staff to avoid using SP or to resent the effort required to actualise these affordances. This prior knowledge of contributing, storing and accessing based on experience with a different information system acted to restrain actualisation of other higher-level organisational knowledge sharing affordances available to them.

> *"Previously I had access to files that were sorted into folders based on individual people's names. So that you could go to an individual and search for things that way." [Interview 7]*

Training

Two consistent and conflicting themes arose from the case regarding training. On the one hand HR staff reported that they had not had training in SP. On the other hand significant resources had been invested in providing one on one support and FAQ resources for staff which they reported to have found valuable and helpful. Rather than simply a difference in the conceptualisation of training this is theorised to be an indication of a perceived need for two different types of training: One, training in the features of SP and the other training to develop individual abilities which would include not only how to use SP but also why to use SP:

> *"I know that the idea of SP is fantastic I think there just needs to be a huge training plan or upskilling of people who use it in order to weigh up is it worth it, how much time are we investing in it to get something that we could get in two seconds from somewhere else." [Interview 4]*

A lack of resourcing for a systematic training programme in relation to SP was acknowledged by the case organisation. The training that had been undertaken was in relation to specific work goals and was usually given as an introductory overview or on demand in the context of completing work tasks. Because of this the interaction of training with other generative mechanisms in the case was skewed toward lower-order affordances such as contributing and storing knowledge and accessing and using knowledge, and to organisational-level affordances where there was an obvious alignment to organisational goals. The training had been delivered by a small group of SP champions who had developed high-levels of competence in using SP as part of their HR roles through trial and error and exploration.

10. A Mid-range Theory of Organisation - Knowledge Sharing Technology Affordance Actualisation

> *"SP in its current state" they said "from a management and access point of view, is a less well-structured and more opaque document file share than it is a solution for managing and extracting value from the information assets it contains"* (Registrar & CIO, 2013, May).

How did that happen?

What follows is a theory to explain what happened in the case organisation when SP was used for knowledge sharing. The central constructs in the theory are the actualised organisational knowledge sharing affordances in the case and interactions between and among them. Dependencies between affordance actualisation processes are theorised to explain how they unfolded over time. Affordance actualisation is a particular kind of generative mechanism contributing to the contextual conditions in the case. Absent affordances, sensemaking, prior knowledge and training are also theorised as contextual conditions in the case with powers to enable or constrain the organisational knowledge sharing outcomes observed.

The twenty five actualised affordances identified in the case (Seventeen enabling and eight constraining) were found to interact according to six higher-level organisational knowledge sharing affordances. These were Capturing and storing knowledge (Affordance 1); Accessing and using knowledge (Affordance 2); Developing knowledge by guiding practice (Affordance 3); Configuring knowledge (Affordance 4); Generating knowledge (Affordance 5); and Deliberately incorporating knowledge (Affordance 6). They are presented in an organisational knowledge sharing affordance dependency diagram (Figure 1) arranged according to three different functions within the affordance actualisation process. These functions are Basic Affordances, Configuring Affordances and Higher-order Affordances.

Relationships between the six higher level organisational knowledge sharing affordances are described within the three affordance actualisation functions with reference to the consistency and extent to which they were actualised, the degree to which they were aligned with the knowledge sharing goals of the organisation and the contextual conditions absent affordances, sensemaking, prior knowledge and training.

Figure 1. Organisational Knowledge Sharing Affordance Dependency Diagram

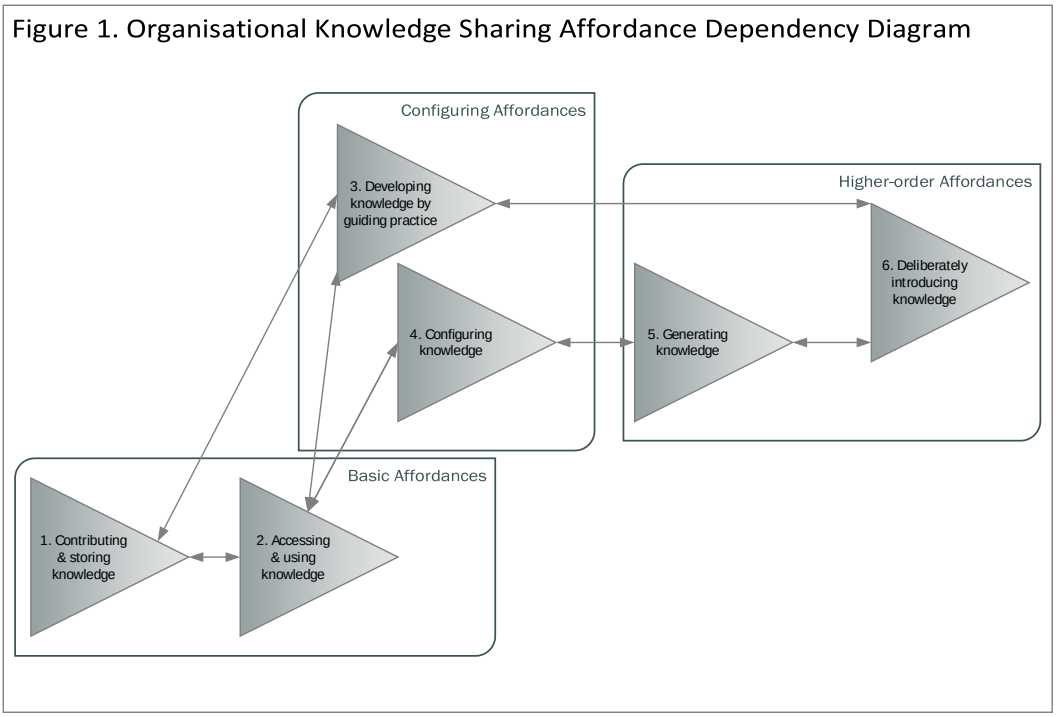

Figure one shows temporal and feedback dependencies between organisational knowledge sharing affordances.

10.1 Basic Affordances

The functions of basic affordances, Contributing and storing knowledge (Affordance 1) and Accessing and using knowledge (Affordance 2) are common to actualisation processes for many information technologies and generalisable to other domains of action. These two affordances are interdependent. On the one hand content must have been contributed before it can be stored and on the other to be able to contribute there must be a storing affordance. Storing is unique in that it describes the state achieved when something is stored as well as the action possibilities storing generated for individuals. SP was referred to as a repository and was said for example to be storing the HR Toolkit Libraries. All of the participants from HR had individually actualised the basic affordances at least to some extent. The basic affordances aligned directly with organisational knowledge sharing goals. Despite variation in the form of individual actualisations collectively across all staff the function of these affordances was extensively actualised.

Contributing and storing knowledge (Affordance 1)

Co-authoring, Editing and Describing were found to be particular types of Contributing and therefore considered to be nested affordances within the higher level Contributing and storing knowledge affordance (Affordance 1). The liabilities Complicating and Blocking caused staff to avoid Contributing and storing knowledge in some circumstances. This meant that they depended on other mechanisms such as email and a shared drive, as well as or instead of SP. Prior knowledge such as knowledge of the shared drive file management structure restrained actualisation of this affordance generating negative feedback when applied unsuccessfully to SP. Training ameliorated this effect to

some extent when there was good alignment between individual goals, organisational goals and the affordance.

There was a great deal of variation between individual actualisations of this affordance which was related to alignment. Actualisation was achieved directly using the features of SP or indirectly by using other technologies available or relying on another person in the system. For example the HR Toolkit Library was strictly managed by a small group of staff acting as "gatekeepers" who controlled what was contributed and stored. In other instances contributing was a regular routine activity conducted as part of day to day work such as entering recruitment details in a spreadsheet or updating and filing master documents. Co-authoring and Editing were absent affordances for some individuals in the case which related to consistency and extent of actualisation.

Accessing and using knowledge (Affordance 2)

Discovering and Linking were found to be particular types of Accessing and therefore considered to be nested within the higher level Accessing and using knowledge affordance (Affordance 2). Alignment related to consistency in the ways in which information and knowledge was accessed from SP. Staff who accessed and used information or knowledge from SP frequently in their roles tended to use a wider range of methods for actualising this affordance. Staff who only needed to access and use knowledge from SP infrequently or for limited aspects of their work were found to be more likely to depend on Linking. The liabilities Impeding, Obscuring and Decontextualising prevented staff from actualising this affordance in some instances.

Linking was the most consistently used method for accessing and using knowledge and was actualised to the greatest extent. It was found to have a Decontextualising effect which was related to sensemaking and restrained the extent of actualisation by other means such as Discovering. Linking enabled individual sensemaking and restrained group-level sensemaking. Actualisation of Affordance 2 by other methods was related to alignment. Some staff consistently actualised some or all of the possible methods to a great extent but most did not. Discovering was an absent affordance for some individuals in the case which related to consistency and extent of actualisation.

10.2 Configuring Affordances

The structure of the configuring affordances Developing knowledge by guiding practice (Affordance 3) and Configuring knowledge (Affordance 4) is particular to the knowledge sharing technology in this study. The function on the other hand is likely to be generalisable to other instances of malleable or generic packaged software commonly used for knowledge sharing in organisations. These affordances are group-level affordances and in a mature knowledge sharing environment might be considered to be the same affordance. There was a notable difference between the actualisations of affordances 3 and 4 in this case and so they are separated in the affordance dependency diagram (Figure 1). Both configuring affordances (Affordances 3 and 4) functioned to represent knowledge to give meaning to content in SP. Developing knowledge by guiding practice (Affordance 3) was configured on behalf of the organisation by staff who's role it was to control this representation of knowledge. Configuring knowledge (Affordance 4) depended upon configuration either by individual users or by coordinating and delegating configuration to an individual with the necessary SP skills and knowledge. Actualisation of higher-order organisational knowledge sharing affordances depended upon the actualisation of either Developing knowledge by guiding practice

(Affordance 3) or Configuring knowledge (Affordance 4). Affordance 3 was directly aligned to the goals of the organisation and was actualised extensively and consistently at the organisational-level. Affordance 4 was loosely and less directly aligned with the goals of the organisation and was only actualised inconsistently and to a moderate extent in the instances when it was actualised.

Developing knowledge by guiding practice (Affordance 3)

Developing knowledge by guiding practice (Affordance 3) includes the nested affordances Securing and Governing both of which impose limits or conditions on the ways in which SP can be used. Affordance 3 also incorporates the Excluding affordance which could be constraining or enabling depending on the context. The HR Personnel Filing site for example had strict controls on who could access it and for what purposes in line with statutory regulation for managing personal and sensitive content. At the organisational-level this enabled statutory compliance. At the individual-level it constrained access. HR practice was guided by what was possible and what was not in relation to this site in SP.

Affordance 3 enabled knowledge representation and was related to sensemaking. The mental model for making meaning which in turn guides practice is an integral component of the affordance. For example the ten stage HR lifecycle maps and guides HR practices throughout the case organisation. Prior knowledge was weakly related, more so for HR staff who had participated in the group decision making process to arrive at the ten drawers in the HR Toolkit to represent the stages in the HR life cycle. There was some inconsistency in individual actualisations of Affordance 3. The function applied across the organisation at individual and group-levels and collectively was extensively actualised.

Configuring knowledge (Affordance 4)

Issues with representing knowledge arose as a consistent theme from the relation between SP and HR staff however only some of the participants had learned to configure SP to represent information and knowledge to be more meaningful for them in their work to any extent. Structuring and Standardising are both means of configuring and are nested in Affordance 4. Configuring knowledge (Affordance 4) was closely aligned with group-level goals and was enabled by sensemaking and training. A Position Descriptions Library with agreed meta-data and a collaborative recruitment site for sharing cultural knowledge, are examples of actualisation of this affordance. Actualisation of Affordance 4 was also related to individual actualisation of basic affordances. HR staff who had not actualised Contributing and storing knowledge (Affordance 1) or Accessing and using knowledge (Affordance 2) were unable to actualise Affordance 4 which restrained group-level actualisation. Configuring knowledge (Affordance 4) was an absent affordance for some individuals which related to consistency, extent and alignment of actualisation.

10.3 Higher-order Affordances

Generating knowledge (Affordance 5) and Deliberately introducing knowledge (Affordance 6) are higher-order organisational knowledge sharing action possibilities in which knowledge is produced as a result of the relation between HR staff and SP that without the knowledge sharing technology would not have been possible. These group –level affordances were only weakly aligned to organisational goals and were actualised inconsistently and to a slight extent. Actualisation of prior

affordances in the dependency pathway was the most significant factor in enabling or constraining actualisation of higher-order organisational knowledge sharing affordances. Positive and negative actualisation attempts generated feedback which was found to be a factor in attitudes toward Configuring affordances and Basic affordances.

Generating knowledge (Affordance 5)

This mechanism promised to power innovation and generate continuous improvement and efficiencies. Generating knowledge is enabled in two ways, by making information and knowledge more visible and by connecting a wider group of staff with information and knowledge. Centralising and Monitoring affordances are nested in this affordance. They enable access to the information and knowledge stored in SP by HR staff members who are physically dispersed across business units and the organisation and who otherwise would not have sight of this knowledge. HR staff bring a diverse range of professional knowledge and personal experiences to their interpretations of this information and knowledge which increases the likelihood of generating new insights. The possibility of Misinforming is included in this affordance as the knowledge generated is not necessarily true.

There was evidence of emergent actualisation of Affordance 5 from the case. For example a community site was set up to encourage exploration and experimentation with SP. The nature of the information and knowledge shared meant that it was only weakly related to individual and organisational goals. Individually it was actualised inconsistently although collectively it was actualised to a moderate extent. Other instances were evident where there was close alignment with organisational goals and the activity related to discrete pieces of work. Examples included a remuneration review and central recording of recruitment details for organisational procedural memory. These instances were actualised consistently and to a great extent. Actualisation of Affordance 5 depended on prior actualisation of configuring affordances and basic affordances. Feedback from actualisation attempts served to reinforce these prior affordances. Generating knowledge (Affordance 5) was an absent affordance for some individuals which related to consistency, extent and alignment of actualisation. There was insufficient evidence in the case to ascertain relationships between contextual factors and actualisation of Affordance 5.

Deliberately introducing knowledge (Affordance 6)

This mechanism promised to actively and intentionally connect staff with information and knowledge stored in SP as well as that which existed in the professional knowledge of staff and in communities of practice. Communicating and Broadcasting affordances are nested in Affordance 6. These affordances enable deliberate introduction of knowledge to individuals and groups who can learn from it. The possibility of Spamming is nested in this affordance.

There were some instances of emergent actualisation of Affordance 6 evident in the case. Automating workflows is a specific means of actualising this affordance whereby knowledge is represented as business rules which can be embedded in SP as processes in such a way as to operate when triggered without human intervention. Actualisation of Automating workflows is associated with very targeted alignment with organisational goals, complete consistency of both structure and function. The extent of actualisation was complete in the instances when it occurred which at the time of the study was infrequently.

Another instance of actualisation of this affordance was Broadcasting of updates using automated email notification. This actualisation was enabled by Affordance 3 Developing knowledge by guiding practice and to a lesser extent Affordance 5 Generating knowledge. Actualisation was related to alignment of individual and group goals. Broadcast messages that were not closely aligned with knowledge sharing goals were ignored by individuals and therefore were not received which impacted on the extent of actualisation. Consistency of actualisation depended on individual receivers of Broadcast messages. Feedback resulting from Spamming and failed actualisation attempts generated negative feelings towards this affordance which in some instances were generalised to all SP affordances. Deliberately introducing knowledge (Affordance 6) was an absent affordance for some individuals which related to consistency, extent and alignment of actualisation. There was insufficient evidence in the case to ascertain relationships between contextual factors and actualisation of Affordance 5.

11. Discussion

This research had two main objectives. The first was to contribute to the development of affordance actualisation theory by applying The Theory of Organisation-EHR Affordance Actualisation (Strong et al., 2014) to another technology in a new organisational setting. The second related objective was to investigate group-level actualisation of knowledge sharing affordances for a public organisation using a knowledge sharing technology.

In this section the findings of the current study will be discussed in relation to the Affordance Actualisation lens provided by Strong et al. (2014) with specific reference to the eight affordances from their study, dependencies between organisational affordance actualisation pathways, the reproduction of the elements of the mid-range theory in a novel context, and the three indicators of emergence of organisational affordance actualisation which are consistency, extent and alignment.

11.1 Organisational Affordances

The current study identified 6 high-level organisational affordances arising from the relation between the knowledge sharing technology and a knowledge intensive public sector organisation, based on the evidence from the case compared with the 8 high-level organisational affordances identified by Strong et al. (2014, p. 67).

The affordances arising from the relation between the electronic health records management system and the healthcare organisation are: -

1. Capturing and archiving digital data about patients
2. Accessing and using patient information anytime from anywhere
3. Coordinating patient care across sites, facilities, and providers
4. Standardising data, processes and roles
5. Monitoring organisational operations
6. Substituting healthcare professionals for each other
7. Incorporating rich information into clinical decision making, and
8. Shifting work across roles

11.2 Basic affordances

There are obvious similarities between the organisational affordances from the two mid-range theories despite the fact that they arise from two different technologies and two different organisational contexts. The first two affordances in both cases, which involve Capturing and Accessing are practically identical and can be said to be generalisable across these two contexts. The technology features, including a common repository and technical infrastructure for anytime anywhere access, and organisational goals relating to legal compliance and timely, cost effective and quality service provision are common in both cases. The characteristics of actors and goal directed actions needed to actualise these affordances in both cases are sufficiently generic as to be assumed across many actors in large contemporary public sector organisations. These two affordances are characterised as basic affordances in the mid-range theory of Organisation-Knowledge Sharing Technology Affordance Actualisation proposed as a result of this study and are likely to be

generalisable to a wide range of different technologies with these basic characteristics and across a wide range of organisational contexts.

11.3 Coordinating and Standardising Affordances

There are elements in common between the third and fourth affordances in both cases although it is useful to consider both the similarities and the differences between them. Connotations of coordinating and standardising are apparent in the affordances from both mid-range theories. Stored protocols and the ability to restrict access are technology features in common as are the organisational goals. There are also subtle but significant differences most obviously in the goal directed actions of actors in each case. Nurses and physicians in a healthcare organisation have particular requirements and ways of working that are different from those of HR staff in a knowledge intensive public sector organisation. Notably the communication requirements in the healthcare organisation are more closely specified and play a different role in the work being undertaken than for HR staff. This is reflected in the Coordinating affordance (Affordance 3) in the Organisation-EHR theory.

Also missing from the electronic health management system is the ability to configure the technology and indeed the necessity for configuring in order to achieve organisational goals and accommodate the goal directed actions of individuals in the organisation. Actualisation of higher-level organisational knowledge sharing were found to be dependent on configuring affordances in the Organisation-Knowledge Sharing Technology theory. Two studies of affordances relating to the same knowledge sharing technology share this finding that negotiation of group practices and generic platform features is critical to successful actualisation of affordances arising in relation to this technology (Dulipovici & Vieru, 2015; Lehrig et al., 2017). Further research could look in greater detail at this aspect of group-level affordance actualisation involving configurable technologies.

11.4 Higher-level Organisational Affordances

Again there are similarities and differences between the remaining four organisational affordances in the Organisation-EHR theory when compared with the two higher-level organisational affordances in the Organisation-Knowledge Sharing Technology theory. Monitoring, incorporating rich information and supporting new social structures in which the work of professional roles can be distributed and managed differently are apparent in both situations. As before there are significant differences in the goal-directed actions needed to actualise these affordances that are related to the different work practices of two quite different professions. The roles in the healthcare organisation appear to be more prescribed and rules based while in the public sector organisation there is an expectation that staff will be empowered and information and knowledge democratised. These two ways of working are fundamentally at odds with one another which is expressed in the organisational affordances that arise.

11.5 Dynamics of Dependencies between Affordances and Contextual Conditions

The organisational knowledge sharing affordance dependency diagram (Figure 1) was adapted from the organisation-EHR theory. Temporal dependencies were depicted and feedback loops were added. Stronger and weaker dependence was not depicted in the Organisation-Knowledge Sharing Technology theory as it was in the original dependency diagram developed by Strong et al. (2014).

Contextual conditions and emergence revealed in the analysis of consistency, extent and alignment gave a rich picture of the dependencies between the causal powers identified in the case that were not captured in the diagram. The suggestion that emergence as opposed to strength of dependence may be a more useful tool for analysis is supported by findings in a study by Hausvik and Thapa (2017). They theorise two levels of emergence, dependent, which relates to the properties of the technology, and interdependent, which relates more to contextual conditions.

Another dependency that was found to impact on emergence and successful group-level actualisation was absence of affordance. A study by Giermindl et al. (2017) investigating non-users through an affordance lens provides insight into reasons for non-use which reveals causal contextual conditions. Mingers and Standing (2017) suggest absence as causes as a topic for future research. Using the affordance actualisation lens to frame absences that might have been expected to be present but are not would be a useful development to better understand these findings. Furthermore relationships between absent affordances and contextual conditions may contribute to understanding temporal and spatial stimulation or lack of it and the question of perception in the affordance actualisation process (Lombardo, 1987). It is likely that guidance for practical intervention could be informed by such research to improve organisational affordance actualisation.

11.6 Mid-range Theory as a Template for Research

Strong et al. (2014) offer the Organisation-EHR Affordance Actualisation theory as an "example and a template". This was found to be valuable in several respects for this study. Firstly the template provided practical tools such as the five elements in the theory – technology features, characteristics of actors, example immediate concrete outcomes, goal-directed actions needed to actualise the affordances and applicable goals in the organisational context (Strong et al., 2014, p. 68). The value of these tools, including the diagrams depicting relationships between organisational levels with feedback loops and the dependency diagram, cannot be overstated for imposing coherence onto an otherwise overwhelmingly complex dynamic and fleeting phenomenon such as organisational affordance actualisation. Secondly the Affordance Actualisation lens, offered while not yet fully developed, has allowed a community of scholars to work to develop these tools (Bernhard et al., 2013; Glowalla et al., 2014; Hausvik & Thapa, 2017; Lehrig et al., 2017). The shared theoretical structure of these research efforts supports rigorous comparison of findings from "diverse specific instances" (Laughlin, 1995, p. 83) providing rich empirical data for discovering mechanisms in common as well as critical differences. Finally application of this mid-range theory to research into organisational knowledge sharing generated rich empirical data that contributes to the body of knowledge on knowledge sharing in information systems research.

11.7 Emergence and group-level actualisations

Consistency, extent and alignment from the Organisation-EHR Affordance Actualisation theory were applied to the analysis of interactions between organisational affordances and contextual conditions as indicators of emergent group-level actualisations. This lens made it possible to discern differences in the configuration of groups and the importance or otherwise of this for organisational affordance actualisation. Collective group-level affordances were able to be actualised successfully by actors working on behalf of the group such as staff with particular roles in responsibilities in relation to the technology. Shared group-level affordances on the other hand required a commitment by all

members to learn the required skills needed to actualise the affordance. The theory made it possible to see the implications for group-level affordance trajectories (Hausvik & Thapa, 2017) if individuals did not or could not actualise particular affordances . This knowledge is likely to prove useful for practitioners seeking to intervene to improve group and organisation-level affordance actualisation. Furthermore the three indicators of emergence helped to isolate which contextual conditions to focus on. Actualisation trajectories suffering weak alignment would benefit from goal clarification and leadership for example while training might be recommended when extent of actualisation is insufficient to achieve the desired goals. Further specification of consistency, extent and alignment such as that contributed by Burton-Jones and Volkoff (2017) and Eden et al. (2018) will make these indicators even more useful.

12. Conclusion

This thesis presents the detailed methodology and empirical findings of a critical realist case study in which organisational knowledge sharing using a knowledge sharing technology was investigated. The tools and techniques of a mid-range theory were faithfully applied in a novel domain as an exercise in critical realist theory development. The theoretical lens developed by Strong et al. (2014) was used to research a different technology in a different organisational context. The findings of the study serve to further develop the theory. Findings in common serve to reinforce the patterns identified in the original work and to expand the generalisability of the theory. Distinctive findings on the other hand serve to refine the theory, finding the boundaries of such generalisation and focusing the metaphorical lens.

The study also generated rich empirical data and a contextually relevant analysis of causal processes involved in using knowledge sharing technology for organisational knowledge sharing. The findings contribute to the body of knowledge on organisational knowledge sharing and in particular on multilevel knowledge sharing processes. Understanding and explaining how knowledge sharing happened in an organisation is likely to be valuable for managers and IT professionals. Implications for research and for practice are presented here along with suggestions for future research.

12.1 Implications for research

This study makes three contributions to research. These are the development of research tools and techniques, the empirical research findings and a mid-range theory of Organisation-Knowledge Sharing Technology Affordance Actualisation.

Findings of this study serve to refine the Affordance Actualisation lens. Capturing and accessing affordances were found to be basic organisational affordances likely to be common in many contemporary organisations using information technologies with database features and technical infrastructure for anytime, anywhere access. This finding expands the generalisability of this aspect of the Theory of Organisation-EHR Affordance Actualisation to a broader domain than healthcare which is the context in which it originated. Contextual conditions related to the types of work and the professional roles of actors in each case led to differences in the way that other causal mechanisms were found to unfold in the two different contexts in which the Affordance Actualisation lens was applied. This finding has implications for future development of the theory.

Three indicators of the emergence of organisational affordance actualisation, consistency, extent and alignment were used in this investigation. The indicators were found to be helpful in identifying causal mechanisms in the case. This study contributes to understanding of how these indicators might be applied in identifying emergent affordance actualisation although their further refinement will be beneficial.

The adapted three step method developed for this study provides a practical data analysis tool for future researchers conducting in depth retrospective critical realist case studies.

The theory of Organisation-Knowledge Sharing Technology Affordance Actualisation contributes another mid-range theory from the context of a knowledge intensive public sector organisation. The Organisational knowledge sharing affordance dependency diagram proposes a trajectory for

actualising affordances arising from the relation between knowledge workers and a knowledge sharing technology. Further development of this model is likely to contribute to deeper understanding of the causal processes involved in multilevel organisational knowledge sharing. The three functions identified in the affordance dependency trajectory contribute to recent research regarding emergence of organisational-level affordance actualisation. It is theorised that contextual conditions relate differently to organisational affordances depending on the function of the affordance in the organisational knowledge sharing affordance trajectory. Collective actualisation of group-level affordances was sufficient to actualise some functions but shared actualisation of the same affordances was necessary to enable actualisation of higher level organisational affordances. Finally configuring was found to be critical in actualising higher level organisational knowledge sharing affordances.

12.2 Implications for practice

The causal mechanisms found in this study that are postulated to explain how knowledge sharing affordances were actualised in the context of a knowledge intensive public sector organisation will I hope be useful for the case organisation. They may also be able to be leveraged to explain events in other similar organisations or in other organisational knowledge sharing contexts. The organisational knowledge sharing affordance dependency diagram provides a model for managers and IT professionals that can inform decisions regarding interventions to optimise knowledge sharing outcomes in pursuit of organisational goals. Interventions such as training can be effectively used to achieve necessary group-level affordance actualisation. Indications of emergence of organisational affordance actualisation help to pinpoint where intervention will have the best effect. This study found that actualisation of basic affordances and top-down configuring affordance may be able to be achieved on behalf of the organisation by individuals assigned that role. Actualisation of upward configuring affordance and higher-order affordances on the other hand is likely to necessitate shared actualisation by members of the group and negotiation of group practices in relation to configuration of the knowledge sharing technology.

12.3 Future Research

This thesis contributes another mid-range theory to the body of knowledge on multilevel organisational knowledge sharing affordance actualisation. Further research that applies this mid-range theory and the mid-range theory of Organisation-EHR Affordance Actualisation (Strong et al., 2014) will contribute to empirical research relating to organisational affordance actualisation, organisational knowledge sharing and the development of affordance actualisation theory.

Emergence of organisational affordance actualisation is identified as an area for further research. More specific definition of the three indicators of emergence, and in particular extent, will contribute to better understanding of how and when interventions might enable organisational affordance actualisation to achieve organisational goals. Investigation of consistency, extent and alignment in different organisational contexts would be useful for clarifying how contextual conditions impact on the emergence of organisational affordance actualisation.

Further investigation of absent affordances as generative mechanisms is likely to contribute to understanding of affordance actualisation processes and may provide insight into the stimulation of affordances and how they arise.

Several aspects of configuration suggest themselves as fruitful topics for future research. Configuration as a function in organisational knowledge sharing affordance actualisation is postulated here as critical to achieving actualisation of higher-order organisational knowledge sharing affordances that arise between knowledge workers and a knowledge sharing technology. Research into upward and top-down configuration would contribute to understanding multilevel organisational knowledge sharing processes. Configuration of malleable technologies is another area for research that would contribute to understanding the causal effects of configuring group practices and of configuring the technology and relationships between them both.

References

Alavi, M., & Leidner, D. E. (1999). Knowledge management systems: issues, challenges, and benefits. *Communications of the AIS, 1*(2es), 1.

Alavi, M., & Leidner, D. E. (2001). Review: Knowledge Management and Knowledge Management Systems: Conceptual Foundations and Research Issues. *Mis Quarterly, 25*(1), 107-136. doi:10.2307/3250961

Anderson, C., & Robey, D. (2017). Affordance potency: Explaining the actualization of technology affordances. *Information and Organization, 27*(2), 100-115.

Argote, L., & Guo, J. M. (2016). Routines and transactive memory systems: Creating, coordinating, retaining, and transferring knowledge in organizations. In A. P. Brief & B. M. Staw (Eds.), *Research in Organizational Behavior: An Annual Series of Analytical Essays and Critical Reviews, Vol 36* (Vol. 36, pp. 65-84).

Bernhard, E., Recker, J. C., & Burton-Jones, A. (2013). Understanding the actualization of affordances: A study in the process modeling context.

Bhattacherjee, A. (2012). *Social science research: principles, methods, and practices* (Vol. 2nd). Tampa, Fla: A. Bhattacherjee.

Bloomfield, B. P., Latham, Y., & Vurdubakis, T. (2010). Bodies, Technologies and Action Possibilities: When is an Affordance? *Sociology, 44*(3), 415-433. doi:10.1177/0038038510362469

Borgen, W. A., Amundson, N., E., & Butterfield, L. D. (2012). Critical incident technique. In L. M. Given (Ed.), The SAGE Encyclopedia of Qualitative Research Methods. Thousand Oaks: SAGE.

Boudreau, M.-C., & Robey, D. (2005). Enacting Integrated Information Technology: A Human Agency Perspective. *Organization Science, 16*(1), 3-18.

Bryman, A., & Bell, E. (2015). *Business research methods* (Fourth Ed.).

Burton-Jones, A., & Volkoff, O. (2017). How Can We Develop Contextualized Theories of Effective Use? A Demonstration in the Context of Community-Care Electronic Health Records. *Information Systems Research, 28*(3), 468-489. doi:10.1287/isre.2017.0702

Bygstad, B., Munkvold, B. E., & Volkoff, O. (2016). Identifying generative mechanisms through affordances: a framework for critical realist data analysis. *Journal of Information Technology, 31*(1), 83-96. doi:10.1057/jit.2015.13

Charband, Y., & Jafari Navimipour, N. (2016). Online knowledge sharing mechanisms: a systematic review of the state of the art literature and recommendations for future research. *Information Systems Frontiers, 18*(6), 1131-1151. doi:10.1007/s10796-016-9628-z

Cook, S. D. N., & Brown, J. S. (1999). Bridging Epistemologies: The Generative Dance between Organizational Knowledge and Organizational Knowing. *Organization Science, 10*(4), 381-400.

Dulipovici, A., & Vieru, D. (2015). Exploring collaboration technology use: how users' perceptions twist and amend reality. *Journal of Knowledge Management, 19*(4), 661-681. doi:doi:10.1108/JKM-11-2014-0468

Eden, R., Akhlaghpour, S., Spee, P., Staib, A., Sullivan, C., & Burton-Jones, A. (2018). *Unpacking the Complexity of Consistency: Insights from a Grounded Theory Study of the Effective Use of Electronic Medical Records.* Paper presented at the Proceedings of the 51st Hawaii International Conference on System Sciences.

Ellison, N. B., Gibbs, J. L., & Weber, M. S. (2015). The Use of Enterprise Social Network Sites for Knowledge Sharing in Distributed Organizations: The Role of Organizational Affordances. *American Behavioral Scientist, 59*(1), 103-123. doi:10.1177/0002764214540510

Elmes, M. B., Strong, D. M., & Volkoff, O. (2005). Panoptic empowerment and reflective conformity in enterprise systems-enabled organizations. *Information and Organization, 15*(1), 1-37.

Faraj, S., & Azad, B. (2012). The Materiality of technology: An Affordance perspective. In P. M. Leonardi, B. A. Nardi, & J. Kallinikos (Eds.), *Materiality and organizing: Social interaction in a technological world* (pp. 237-258). Oxford: Oxford University Press.

Freeman, J. (2012, December). *SharePoint Positioning Paper*. Unpublished Internal Document.

Gibson, J. J. (1979). *The ecological approach to visual perception*. Boston: Houghton Mifflin.

Giermindl, L., Strich, F., & Fiedler, M. (2017). Why do you NOT use the Enterprise Social Network? Analyzing Non-Users' reasons through the lens of Affordances.

Glowalla, P., Rosenkranz, C., & Sunyaev, A. (2014). *Evolution of IT use: A case of business intelligence system transition.* Paper presented at the 35th International Conference on Information Systems "Building a Better World Through Information Systems", ICIS 2014, Auckland, NZ.

Gustavsson, B. (2001). Power over meaning; unlearning and human values. *Management of Power–Ethical and Values Aspects, 339*, 358.

Hausvik, G. I., & Thapa, D. (2017). "What You See is Not What You Get"-Challenges in Actualization of EHR Affordances.

Henfridsson, O., & Bygstad, B. (2013). The Generative Mechanisms of Digital Infrastructure Evolution. *Mis Quarterly, 37*(3), 907-931.

Hutchby, I. (2001). Technologies, Texts and Affordances. *Sociology, 35*(2), 441-456.

Ibrahim, F. (2015). *Knowledge Management Methodology: Developing a 'Middle-Range Thinking Approach'for Knowledge Management Research.* Paper presented at the International Conference on Intellectual Capital and Knowledge Management and Organisational Learning.

Ibrahim, F. (2017). Knowledge Management Methodology: Developing a Phenomenalogical Middle-range Thinking Approach for Knowledge Management Research. *Journal of Management Research, 9*(4), 110. doi:10.5296/jmr.v9i4.10790

Ipe, M. (2003). Knowledge sharing in organizations: A conceptual framework. *Human resource development review, 2*(4), 337-359.

Kane, G. C., & Alavi, M. (2007). Information technology and organizational learning: An investigation of exploration and exploitation processes. *Organization Science, 18*(5), 796-812. doi:10.1287/orsc.1070.0286

Klein, J. H. (2008). Some directions for research in knowledge sharing. *Knowledge Management Research & Practice, 6*(1), 41-46. doi:10.1057/palgrave.kmrp.8500159

Laughlin, R. (1995). Empirical research in accounting: alternative approaches and a case for "middle-range" thinking. *Accounting, Auditing & Accountability Journal, 8*(1), 63-87.

Lehrig, T., Krancher, O., & Dibbern, J. (2017). How Users Perceive and Actualize Affordances: An Exploratory Case Study of Collaboration Platforms.

Leonardi, P. M. (2011). When flexible routines meet flexible technologies: Affordance, constraint, and the imbrication of human and material agencies. *MIS Quarterly: Management Information Systems, 35*(1), 147-167.

Leonardi, P. M. (2013a). Theoretical foundations for the study of sociomateriality. *Information and Organization, 23*(2), 59-76. doi:10.1016/j.infoandorg.2013.02.002

Leonardi, P. M. (2013b). When does technology use enable network change in organizations? A comparative study of feature use and shared affordances. *MIS Quarterly: Management Information Systems, 37*(3), 749-776.

Leonardi, P. M. (2017). The social media revolution: Sharing and learning in the age of leaky knowledge. *Information and Organization, 27*(1), 47-59.

Leonardi, P. M., & Barley, S. R. (2008). Materiality and change: Challenges to building better theory about technology and organizing. *Information and Organization, 18*(3), 159-176. doi:http://dx.doi.org/10.1016/j.infoandorg.2008.03.001

Lombardo, T. J. (1987). *The reciprocity of perceiver and environment: the evolution of James J. Gibson's ecological psychology*. Hillsdale, NJ: L. Erlbaum Associates.

Mabey, C., & Zhao, S. (2017). Managing five paradoxes of knowledge exchange in networked organizations: new priorities for HRM? *Human Resource Management Journal, 27*(1), 39-57. doi:doi:10.1111/1748-8583.12106

Majchrzak, A., Faraj, S., Kane, G. C., & Azad, B. (2013). The Contradictory Influence of Social Media Affordances on Online Communal Knowledge Sharing. *Journal of Computer-Mediated Communication, 19*(1), 38-55. doi:10.1111/jcc4.12030

Markus, M. L., & Silver, M. S. (2008). A Foundation for the Study of IT Effects: A New Look at DeSanctis and Poole's Concepts of Structural Features and Spirit*. *Journal of the Association for Information Systems, 9*(10/11), 609.

Microsoft. (2013). Getting to know SharePoint *https://www.microsoft.com/en-nz/download/details.aspx?id=39372*: Microsoft Corporation.

Microsoft. (2018). SharePoint your mobile, intelligent intranet. Retrieved from https://products.office.com/en-us/sharepoint/collaboration

Mingers, J. (2008). Management knowledge and knowledge management: realism and forms of truth. *Knowledge Management Research & Practice, 6*(1), 62-76. doi:10.1057/palgrave.kmrp.8500161

Mingers, J., Mutch, A., & Willcocks, L. (2013). Critical realism in information systems research. *Mis Quarterly, 37*(3), 795-802.

Mingers, J., & Standing, C. (2017). Why things happen–Developing the critical realist view of causal mechanisms. *Information and Organization, 27*(3), 171-189.

Mingers, J. C. (1995). Information and meaning: foundations for an intersubjective account. *Information Systems Journal, 5*(4), 285-306.

Nonaka, I. (1994). A Dynamic Theory of Organizational Knowledge Creation. *Organization Science, 5*(1), 14-37. doi:10.1287/orsc.5.1.14

Nonaka, I., Toyama, R., & Konno, N. (2000). SECI, Ba and Leadership: a Unified Model of Dynamic Knowledge Creation. *Long Range Planning, 33*(1), 5-34. doi:https://doi.org/10.1016/S0024-6301(99)00115-6

Orlikowski, W. J. (2007). Sociomaterial practices: Exploring technology at work. *Organization Studies, 28*(9), 1435-1448. doi:10.1177/0170840607081138

Polanyi, M. (2009). *The tacit dimension*: University of Chicago press.

Pozzi, G., Pigni, F., & Vitari, C. (2014). *Affordance theory in the IS discipline: A review and synthesis of the literature.* Paper presented at the 20th Americas Conference on Information Systems, AMCIS 2014.

Registrar & CIO (2013, May). *SharePoint and Risk Management*. Unpublished Internal Document.

Rikowski, R. (2003). Value — The Life Blood of Capitalism: Knowledge is the Current Key. *Policy Futures in Education, 1*(1), 160-178. doi:10.2304/pfie.2003.1.1.5

Robey, D., Anderson, C., & Raymond, B. (2013). Information technology, materiality, and organizational change: A professional Odyssey. *Journal of the Association of Information Systems, 14*(7), 379-398.

Seidel, S., Recker, J., & vom Brocke, J. (2013). SENSEMAKING AND SUSTAINABLE PRACTICING: FUNCTIONAL AFFORDANCES OF INFORMATION SYSTEMS IN GREEN TRANSFORMATIONS. *Mis Quarterly, 37*(4), 1275-+.

Strong, D. M., Johnson, S. A., Tulu, B., Trudel, J., Volkoff, O., Pelletier, L. R., . . . Garber, L. (2014). A Theory of Organization-EHR Affordance Actualization. *Journal of the Association for Information Systems, 15*(2), 53-85.

Strong, D. M., & Volkoff, O. (2010). Understanding Organization—Enterprise System Fit: A Path to Theorizing the Information Technology Artifact. *Mis Quarterly, 34*(4), 731-756.

Todorava, N., Remus, U., & Cragg, P. (2012). *KM valus creation: Evidence from a case*. Paper presented at the 23rd Australasian Conference on Information Systems.

Twum-Darko, M., & Harker, L.-A. L. (2017). Understanding Knowledge Sharing in an Organization: A Perspective of Actor-Network Theory. *International Journal of Knowledge Management (IJKM), 13*(1), 53-74. doi:10.4018/IJKM.2017010104

Vaghefi, I., Lapointe, L., & Shahbaznezhad, H. (2018). A multilevel process view of organizational knowledge transfer: enablers versus barriers. *Journal of Management Analytics, 5*(1), 1-17. doi:10.1080/23270012.2018.1424572

Volkoff, O., & Strong, D. M. (2013). Critical realism and affordances: Theorizing IT-associated organizational change processes . *Mis Quarterly, 37*(3), 819-834.

Volkoff, O., & Strong, D. M. (2016). *Affordance Theory and how to use in in IS research*. Unpublished paper.

Wang, H., Wang, J., & Tang, Q. (2018). A Review of Application of Affordance Theory in Information Systems. *Journal of Service Science and Management, 11*(01), 56.

Wang, S., & Noe, R. A. (2010). Knowledge sharing: A review and directions for future research. *Human Resource Management Review, 20*(2), 115-131. doi:10.1016/j.hrmr.2009.10.001

Welschen, J., Todorova, N., & Mills, A. M. (2012). An investigation of the impact of intrinsic motivation on organizational knowledge sharing. *International Journal of Knowledge Management (IJKM), 8*(2), 23-42.

Winter, S., Berente, N., Howison, J., & Butler, B. (2014). Beyond the organizational 'container': Conceptualizing 21st century sociotechnical work. *Information and Organization, 24*(4), 250-269. doi:https://doi.org/10.1016/j.infoandorg.2014.10.003

Wynn , D. J., & Williams, C. K. (2012). Principles for conducting critical realist case study research in information systems. *Mis Quarterly, 36*(3), 787-810.

Wynn , D. J., Williams, C. K., Volkoff, O., & Strong, D. M. (2013). *Critical realism and mechansims: Moving from the philosophical to the empirical in the search for causal explanations*. Paper presented at the Nineteenth Americans Conference on Information systems, Chicago, Illimois.

Zammuto, R. F., Griffith, T. L., Majchrzak, A., Dougherty, D. J., & Faraj, S. (2007). Information Technology and the Changing Fabric of Organization. *Organization Science, 18*(5), 749-762.